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SUBPHRENIC ABSCESS: REPORT OF THREE CASES ILLUSTRATING DIAGNOSTIC PROBLEMS*

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Subphrenic abscess is a collection of pus in the subphrenic space. The subphrenic space is the space between the diaphragm and the liver. This space is normally only potential, the liver and diaphragm being in close proximity, but it is capable of becoming actual by the introduction or accumulation of abnormal matter, such as air, pus, blood, or other fluid. The under surface of the diaphragm is marked out into four peritoneal spaces and two cellular ones (Barnard). The four peritoneal spaces are separated from each other by the cruciform arrangement of the ligaments of the liver, these being the falciform, coronary and right and left lateral ligaments. The falciform divides the space into right and left parts. Each of these is divided into two parts, a larger anterior and a smaller posterior space, by the corresponding lateral ligaments. The two extraperitoneal cellular spaces are designated right and left. The right extraperitoneal subphrenic space is between the layers of the coronary ligament, while the left includes the perinephric tissues around the upper end of the left kidney. When an abscess develops in this space the peritoneum is stripped off the under surface of the left dome of the diaphragm. While this description of the subphrenic space is probably the most complete, Lockwood states that it is somewhat illogical and not altogether correct, in that the dividing line between the anterior and posterior spaces is not well defined. He apparently does not consider the extraperitoneal spaces of sufficient importance to more than mention them as having been described by Barnard. For practical purposes I shall simplify the anatomical classification and speak of the right and left subdiaphragmatic spaces.

ETIOLOGY

Abdominal infection is the chief factor in the etiology of subphrenic abscess, but the precise causes are many and varied. Lockwood states that approximately two-thirds of the cases reported resulted from infection of a hollow viscus before or following laporatomy. One-sixth were the result of extension from an adjacent abscess, such as a perinephritic abscess, and the remaining one-sixth originated in a distant focus such as a carbuncle. Some of the primary conditions recorded as being causative factors are as follows: appendicitis, liver abscess, perforated gastric ulcer (anterior and posterior), perforated duodenal ulcer (anterior and posterior), perforated intestine, pyosalpinx, pyaemia, suppurative cholangitis, pneumonia, ruptured liver, pancreatitis, carcinoma of the liver, stomach, pylorus or pancreas, bronchiectasis, resection of stomach or bowel (large or small), infarct of spleen, pelvic abscess, typhoid fever, parturition, hydatid of liver, suppurative cholecystitis, traumatism, nephritic abscess, splenic abscess, infected spinal abscess, osteomyelitis of ribs, distal cellulitis, carbuncle and lung abscess. The direct cause in postoperative cases is broken operative technique, either avoidable or unavoidable. In the non-operated cases a perforated viscus, usually gastric ulcer of the lesser curvature, is the most common cause.

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* Read before the Society, April 8, 1931.

BACTERIOLOGY

The organisms most frequently found in subphrenic abscess are B. coli communis, Staphylococcus aureus, Streptococcus (hemolyticus and viridans), Pneumococcus, B. pyocyaneus, B. typhosus and rarely Gonococcus. Inasmuch as gas in the subphrenic space is a frequent concomitant of subphrenic abscess, mention should be made of the possible sources. The common gas-producing organism is B. aerogenes capsulatus. Infection with this organism is so rapidly fatal that consideration of it in connection with subphrenic abscess is unnecessary. Other less virulent organisms of the intestine may, however, be the cause of the gas. In cases of subphrenic abscess due to ruptured gastric ulcer, atmospheric air ingested in the process of deglutition, or gases the result of fermentation by various yeasts and by the action of sarcinae in hypoacid states, will escape into the abdominal cavity. The small bowel normally does not contain gas.

PATHOLOGY

The abscesses are either acute or chronic, and the latter may not be recognized for weeks or months or even a year or more and may cause the greatest difficulty in diagnosis (Gatewood). Since the peritoneum encloses the subphrenic spaces, the pathologic changes begin as a localized peritonitis. There is a more or less profuse exudate which after a time, usually several days, becomes turbid with leucocytes. The margins of the area involved begin to be defined about the fourth or fifth day, and the abscess proper is not definitely walled off and localized until about the fourteenth day. While the cavity is usually a single one it may be multilocular. The importance of this in the surgical treatment is obvious.

DIAGNOSIS

The most significant point in the diagnosis of this condition is the history of a recent abdominal operation, as approximately 70 per cent of the reported cases have followed such procedure. The condition should be thought of in any postoperative case of abdominal surgery in which the temperature and pulse rate are elevated and remain so for any length of time and for which there is no obvious cause. The pulse rate in subphrenic abscess keeps pace with the temperature, but the respiratory rate may not be in keeping with either the temperature or pulse. Variations in temperature may be marked. Pain in the right lower chest is usually present and may be referred to the back or to the shoulder. Hiccough is a not uncommon symptom due to irritation of the endings of the phrenic nerve in the diaphragm. Chills and sweats, cough and vomiting are also common symptoms. In cases in which a diagnosis is not made early, progressive loss of weight and emaciation are noted. In cases with large quantities of pus the diaphragm is elevated and the liver displaced downward. A friction rub in the right lower chest may be present in the early stage and lead to a diagnosis of pleurisy. There is usually ascending dullness which may vary as one passes over the layer cake arrangement of the shifting signs. From above downward in the back these layers or zones may be and usually are as follows: (1) Normal resonance from normal lung; (2) moderate dullness from compressed lung; (3) hyperresonance or tympany from gas (if present); (4) marked dullness from pus; (5) flatness or absolute dullness from the liver.

ROENTGEN SIGNS

Normally the right diaphragm is approximately one inch higher than the left. This is due to the position of the liver. The left leaf of the diaphragm has a somewhat wider excursion normally than the right for the same reason. The disproportion between the levels of the two sides is best seen on deep inspiration. Roentgenoscopically and stereoscopically the costophrenic angles are normally clear. The upper border of the right leaf of the diaphragm lies at the upper border of the fifth rib in front in the average individual. The left leaf lies at the upper border of the sixth rib. The diaphragm on the right follows the contour of the liver and may be smooth and rounded or irregular depending on the contour of the liver. The left leaf is usually smooth and rounded, due to the gas bubble normally present in the cardia of the stomach just beneath. In any inflammatory condition near the diaphragm, such as lobar pneumonia, fibrinous pleuritis, subphrenic abscess, liver abscess, etc., the diaphragm may be partly fixed or immobile on the affected side (the inhibitory reflex). Upward displacements of the diaphragm result from eventration, paralysis of the phrenic nerve on the affected side, tumors of abdominal viscera (the liver, stomach, spleen, kidney, or suprarenal gland), and fluid, pus, gas or air in the subphrenic space. These cause unilateral elevations. Ileus, serositis with free fluid in the peritoneal cavity, free fluid from other causes, and other conditions causing increase in intra-abdominal pressure may elevate the diaphragm bilaterally. In subphrenic abscess the height to which the diaphragm rises is dependent on and determined by the amount of fluid or gas or both which may be present in the subphrenic space. It should be borne in mind that pus in the posterior space, or perinephritic abscess, may not displace the diaphragm to any great extent. When the patient is examined fluoroscopically in the upright position the following roentgen evidence is presented and visualized if all the signs are present: (1) Elevated immobile diaphragm; (2) semilunar area of increased radiability when air or gas is present; (3) sharply defined horizontal line forming the base of the half-moon when fluid and gas are present; (4) increased density or decreased radiability in the lower lobe, due to compression of the lung; this may amount to almost or complete atelectasis; (5) Cloudy costophrenic angle or sulcus due to transudate through the diaphragm or as a response to irritation of the contiguous pleura.

In patients who are so ill that examination in the upright position is not feasible and who can be roentgenoscoped only in the supine or prone position the fluid level in all probability will not be seen. In these cases the lateral view may clarify the situation. If a biplane roentgenoscope is not available a radiograph will answer the purpose in every respect, except that the succusion waves cannot actually be visualized in motion. The film shows the sharply defined horizontal line that always means mobile fluid. The lateral examination is made with the patient lying on the sound side. When a fluid level is present a spectacular demonstration may be made with the fluoroscope. With the patient in the upright position there is a horizontal shadow corresponding to the base of the half moon previously described. When he bends to the right and left, the base remains horizontal as the rounded dome moves to the right or left. If the patient is gently shaken rippling succussion waves are seen on the screen and simultaneously heard with a stethoscope or even felt with the palpating hand.

COMPLICATIONS

The most common complication in undiagnosed cases or in those not seen early in the disease is rupture of the abscess into the pleura. Cases are reported which have ruptured into the pleura with a resultant empyema, into the lung causing lung abscess, and into a bronchus with drainage by this route and eventual recovery. The abscess may rupture into the general peritoneal cavity, the stomach, small bowel (though this is rare), into the colon, or even through the skin of the anterior abdominal wall. Pericardial effusion, liver abscess and perinephritic abscess are also reported as complications. The rarity of rupture into the bowel is understood when we realize that the bowel has little opportunity to come into contact with the abscess because the stomach and liver separate them. Lockwood states that in somewhat less than one-third of the neglected cases the abscesses either resolve or open spontaneously. Death occurs from toxemia and the general weakness and inanition. Rupture into the general peritoneal cavity is very rare.

PROGNOSIS

Lockwood states that, of 81 patients operated upon, one-third of them died and of 32 not operated upon, 31 died. He has collected statistics from other sources, which show a mortality without operation varying from 82 to 100 per cent, and a mortality with operation varying from 27 to 56 per cent.

TREATMENT

The treatment is mainly surgical, with assistance from the usual hygienic, dietetic and drug therapy. Lockwood in his very comprehensive paper gives in detail a satisfactory technique of the operation in right-sided subphrenic abscess, which is the most common. The reader is referred to his paper.

ILLUSTRATIVE CASES

Case 1. White male, aged 49. Previous and family history irrelevant. The present illness began with sudden violent pain in the epigastrium. A diagnosis of ruptured gastric ulcer was made. The patient refused operation. His condition grew progressively worse. Pain developed in the right lower chest, the temperature and pulse rate were increased, and there was a gradual loss of weight. Two weeks after the onset of pain he was induced to report for roentgen examination. The right diaphragm was markedly elevated and fixed, with a gas bubble and a definite fluid level beneath. The fluid was thin, since it could be excited to movement by slight palpation. The stomach was low and showed a perforating ulcer on the lesser curvature near the incisura angularis. Manipulation and further examination were not done.

Operation revealed a large quantity of pus in the subphrenic space, which was evacuated. The patient eventually recovered.

Case 2. White female, aged 27, para ii, past and family history irrelevant. Present illness began on November first, 1930. A history of attempted induced abortion several days previously was obtained. Her complaint was severe cramp-like pains in the lower abdomen. She entered Sibley Hospital November 2, 1930, at 2 A.M. Temperature on admission was 100.6°F, pulse 120, respirations 32. The abdomen was distended. The pains continued intermittently and a three-month foetus and placenta were expelled intact at 3:30 A.M. The temperature returned to normal the following day, but later rose to 100.8° and signs of general peritonitis developed. Routine treatment was instituted. The temperature remained up, though not higher than 100.6°F, until November 10th, when a plastic pleurisy developed in the right lower chest. This was followed by an amelioration of symptoms for the next few days. The signs in the right lower chest then changed and it was believed that a pleurisy with effusion was present. Roentgen study made November 14, 1930, in the prone position was reported in part as follows: "The left diaphragm is dome-shaped and reaches to the level of the upper border of the eighth rib behind, it is well outlined by reason of a large gas bubble in the stomach just beneath. The right diaphragm is elevated, rounded, and reaches to the level of the middle of the sixth rib behind. The right costophrenic angle is hazy. There is a strong suggestion of subphrenic abscess." A consulting surgeon did not feel that operation was indicated at this time. The patient's condition became progressively worse and the chest was reexamined radiographically in the prone position on November 24th. At this time the right diaphragm was on a level with the fourth rib and the liver shadow was at the upper border of the sixth rib. Between the diaphragm and the liver there was an area of increased radiability which was believed to be gas and fluid, although a definite fluid level was not seen. (Fig. 1.) Operation was now decided upon. An incision was made in the ninth intercostal space in the axillary line and odorless gas escaped from the subphrenic space. The liver and diaphragm were exposed and no pus was found. The incision was closed without drainage. The patient's condition became progressively worse. Further roentgen study of the chest November 29th revealed the left diaphragm at the upper border of the ninth rib and the right diaphragm just above the upper border of the seventh rib with an area above believed to be compressed lung. A gas bubble was not seen at this time. The patient died November 30th at 11 P.M. Autopsy revealed the cause of death to be acute suppurative endometritis and puerperal sepsis. There was also a localized, semi-organized abscess in the pouch of Douglas and subacute fibrinous generalized peritonitis. The liver was quite large and markedly displaced upward into the thoracic region. It weighed 1,933 grams. Quoting the autopsy report verbatim, "It (the liver) is markedly swollen, soft, and quite pale, undergoing a marked degree of toxic

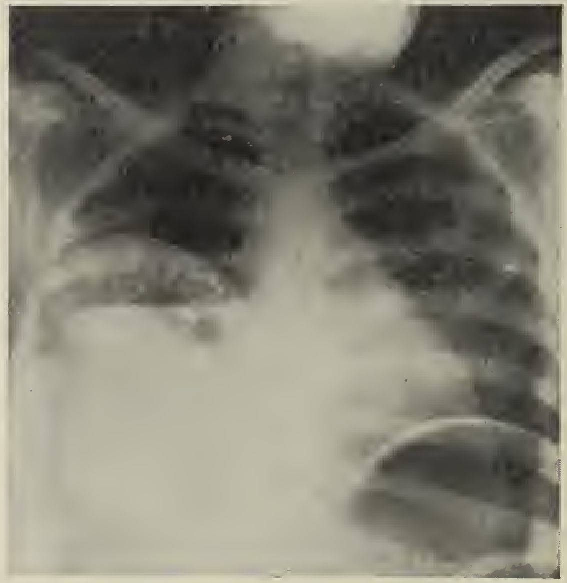

FIG. 1. CASE 2. ROENTGENOGRAM SHOWING ELEVATED DIAPHRAGM WITH GAS BUBBLE BENEATH

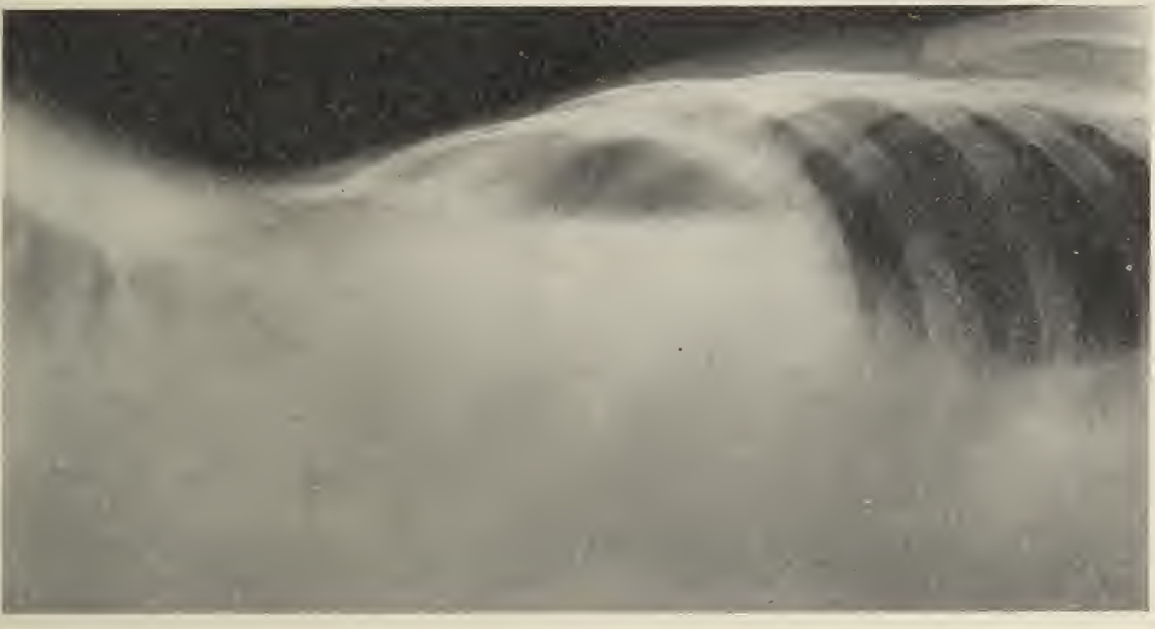

FIG. 2. CASE 3. ROENTGENOGRAM SHOWING FLUID LEVEL AND GAS BUBBLE IN LATERAL VIEW

parenchymatous degeneration. The right diaphragm is slightly adherent to the anterior surface of the liver. There is no collection of exudate, blood or extraneous matter in the subdiaphragmatic area. The left leaf of the diaphragm is adherent to the spleen and stomach by fresh fibrinous adhesions and in this area of the diaphragm no exudate is noted." The right lung was compressed in its lower portion almost to a state of complete atalectasis. Perforations of the viscera were not found. Cultures from the abscess in the pouch of Douglas showed Bacillus coli communis (hemolytic) predominating, Bacillus coli communis (non-hemolytic), and Staphylococcus aureus.

This case is obviously one of puerperal sepsis, the infection being due to Staphylococcus aureus and Bacillus coli communis, the latter being the source of the gas in the subphrenic space. This in conjunction with the markedly swollen liver encroaching on the thoracic cavity and elevating the diaphragm accounts for the diagnosis of subphrenic abscess.

Case 3. White female, aged 57. Family history irrelevant. Past history irrelevant, except for a long history of obstinate constipation and attacks of pain in the epigastrium which had no particular relation to meals and which were usually accompanied by nausea and vomiting. No blood was ever seen in the vomitus or in the stool. There was no history of abdominal operations. The patient was admitted to Sibley Hospital December 22, 1930. Present illness began one week before admission, with an attack of severe pain in the upper abdomen. This required morphine for relief and was tentatively diagnosed as gall-stone colic. The pain persisted and there was some nausea and vomiting. The temperature rose to 100°F, the pulse to 105. The temperature remained above normal during hospitalization with occasional remissions to normal, the highest at any time being 102.6°F. The leucocyte count varied from 16,000 to 30,000; the urine was negative. The chief complaint during the stay in the hospital was of a "band of steel" around the right lower chest. Roentgen study of the chest in the prone position, January 6, 1931, showed the right diaphragm slightly elevated, with a definite gas pocket between the liver and the diaphragm. The following day, January 7, 1931, the patient was reexamined in the left lateral position. A definite fluid level and gas pocket were demonstrated. (Fig. 2.) Transpleural operation, with aspiration through the diaphragm in all directions, failed to elicit pus or fluid, although a small amount of clear fluid was seen in the pleural cavity. The incision in the ninth intercostal space was closed without drainage. The course was progressively downward and the patient died on January 16, 1931. Permission for autopsy was not obtained.

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DIVERTICULITIS OF THE SIGMOID

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Diverticula may occur in any portion of the intestinal tract from the esophagus to the rectum, but are more common in the colon. The sigmoid is the segment of the bowel most frequently involved. On account of the tendency for diverticula in this region to become inflamed, my remarks will be confined to diverticulitis of the sigmoid.

In 1853 Virchow described a condition of the colon which he called "isolated circumscribed adhesive peritonitis," but he thought the symptoms were due to inflammation in some other viscus. It was not until 1898 that Graser demonstrated the presence of inflamed diverticula of the colon as the cause of left-sided peritonitis. Before that time many cases had been found at operation and necropsy but the cause and the pathology were not understood, the condition not infrequently being thought to be due to carcinoma. Beer published the first English article on diverticultis in 1904, and three years later Mayo, Wilson and Giffin reported a series of cases operated upon in which the complications, clinical picture and detailed pathological findings were described. Moynihan was evidently referring to diverticulitis in his paper "The Mimicry of Malignant Disease of the Large Intestine" published in 1904. Carman in 1914 reported three cases which showed the aid of the X-ray and barium enema in the diagnosis. In the last twenty years numerous articles have appeared in the literature.

Today, with the aid of the X-ray, diverticula of the colon are not an uncommon finding; however, all cases do not produce trouble. The condition is known as diverticulosis when diverticula are present without symptoms, and diverticulitis when there is inflammation of the diverticula. In Judd's series of cases of diverticulitis, the sigmoid was involved in 75 per cent of the cases and in Masson's in 81 per cent. The frequency of diverticulitis is shown by Judd and Pollock, who report that one-third of the positive X-ray examinations of the colon in the Mayo Clinic in 1923 disclosed diverticulitis or diverticulosis.

Diverticula may be single or multiple, and cases have been reported in which the whole sigmoid and descending colon were studied. They vary in size from microscopic evaginations of the mucous membrane to the size of a hen's egg, but are usually that of a pea. They may be found at any point on the circumference of the bowel, but are most numerous on the lateral walls opposite the mesenteric border. The small mucosal herniae penetrate the muscular wall and are covered with subserous fat and peritoneum. As they grow in size they extend toward the mesentery and into the appendices epiploicae. This type of diverticulum is known as the acquired or false variety in contradistinction to the true or congenital type, such as Meckel's diverticulum and the appendix.

As long as there is free drainage of the diverticulum, which prevents the formation of hard fecoliths and the retention of foreign bodies, there will be few changes present in the sac. When obstruction to the neck takes place infection may occur, with resultant acute inflammatory changes similar to those in acute appendicitis. The inflammation may progress to gangrene and perforation with abscess formation or general peritonitis. There is a tendency toward recession of the inflammatory process into a latent or chronic stage. In the chronic stage the inflammation extends through the walls of the sac, involving the whole wall of the bowel and resulting in thickened, inflamed, edematous tissue. This condition is called peridiverticulitis. Further extension of the process may result in chronic inflammation of the mesentery and surrounding viscera, fistula formation with the bladder or small intestine, obstruction of the lumen or malignancy. Frequently a mass is present in the left lower abdomen which suggests cancer.

The exact cause of diverticulitis of the sigmoid is not known, but there are several factors which contribute some part in the production of the disease. The sigmoid normally is the reservoir for the feces before they are evacuated into the rectum. Stasis in this region with resultant constipation and increased intracolonic pressure plays a part. In the other segments of the colon where the contents are fluid or semisolid diverticula rarely give any trouble. Hartwell and Cecil favor the theory of a congenital weakness in the muscle wall of the colon. Drummond believes the openings in the bowel wall for the blood vessels weaken the wall, and he compares their rôle in the formation of sacculi to the spermatic cord in hernia.

More frequently males are affected than females. Most cases occur in the middle-aged, although cases in children have been reported. In Giffin's series of 27 cases the average age was 54 years, and in Mayo's series of 42 cases the average age was 53 years. Obesity is a common predisposing factor. Rankin describes the diverticulitis type as short in stature, fleshy and middle-aged. The type is similar to that in which gall bladder disease occurs. The average weight of 116 patients operated on for diverticulitis and reported by Masson was 170 pounds. An almost constant finding is an abnormal amount of fat in the wall of the bowel, in the appendices epiploicae and in the mesentery, all of which probably weaken the muscular wall.

Uncomplicated diverticula of the sigmoid produce no symptoms and may exist for many years without causing trouble. The symptoms of diverticulitis vary according to the extent of the lesion, the progress of the inflammation and the complications. The symptoms range from those of a mild intra-abdominal inflammation to those of an abscess, intestinal obstruction or general peritonitis. Constipation and attacks of more or less severe pain are usually the outstanding symptoms. Mayo recognizes four clinical varieties: (1) absence of symptoms; (2) acute diverticulitis; (3) chronic diverticulitis; (4) chronic diverticulitis associated with malignancy.

Acute diverticulitis resembles acute appendicitis and for that reason is called "left-sided appendicitis." There is pain in the left lower quadrant of the abdomen associated with tenderness, rigidity, fever, leucocytosis and sometimes nausea and vomiting. Perforation with abscess formation and peritonitis may occur, but usually the inflammation tends to subside and the condition to change slowly into the chronic type.

The chronic type is characterized by repeated attacks of pain of varying intensity associated with tenderness and frequently a tumor in the left lower abdomen. The latter may disappear in time and the patient return to good health. Mayo designates this type as self-limiting diverticulitis and peridiverticulitis. Abscess formation with or without resulting fistula is not uncommon and presents a picture which is difficult to diagnose and manage. A tender mass in the left side with fever, pain, constipation, leucocytosis and indigestion are the usual symptoms. The attacks may recur from time to time. Ulceration into the bladder and small intestine may occur with formation of a fistula. The passage of gas and feces with the urine denotes a vesico-colic fistula. However, symptoms of chronic cystitis alone may be present, and the fistula may be overlooked unless cystoscopic examination is done. Acute or chronic obstruction may occur at any time in the course of the disease. Acute obstruction is usually due to infection with marked swelling and edema of the wall of the bowel and narrowing of its lumen. The large, infected mesentery assists in the obstruction by fixing the sigmoid and at the same time pressing into its lumen. The symptoms of this condition are those of acute obstruction with inflammation. Kinking of the sigmoid by adhesions and contracture of scar tissue from the repeated infections with narrowing of the lumen produce symptoms of chronic obstruction.

Diverticulitis associated with carcinoma occurs often enough in the sigmoid to make us look with suspicion on all cases of diverticulitis in which there is passage of blood. Blood in the stool is not common. Giffin reported it in one case and Judd in 18 per cent of his series. Wilson in 1911 compared the relation of diverticulitis of the sigmoid and cancer to the development of carcinoma in the base of an ulcer of the stomach. He pointed out that when the symptoms persist in chronic diverticulitis, malignancy should be suspected, since there is no tendency to a recession of symptoms once cancer has developed upon the inflammatory lesion.

The diagnosis of diverticulitis of the sigmoid can frequently be made by the history of left-sided abdominal pain associated with tenderness, rigidity, fever, leucocytosis and frequently a palpable, tender mass. The X-ray reveals diverticulitis of the sigmoid in the chronic quiescent stage by showing the small round or oval shadows of the diverticula filled with barium protruding from the bowel lumen associated with spasm or organic narrowing of the bowel. Diverticula may fail to fill with barium, especially in the acute and subacute stages, due to the openings being obstructed by stenosis, edema or fecal matter. In such event, with the presence of a mass, diverticulitis resembles carcinoma.

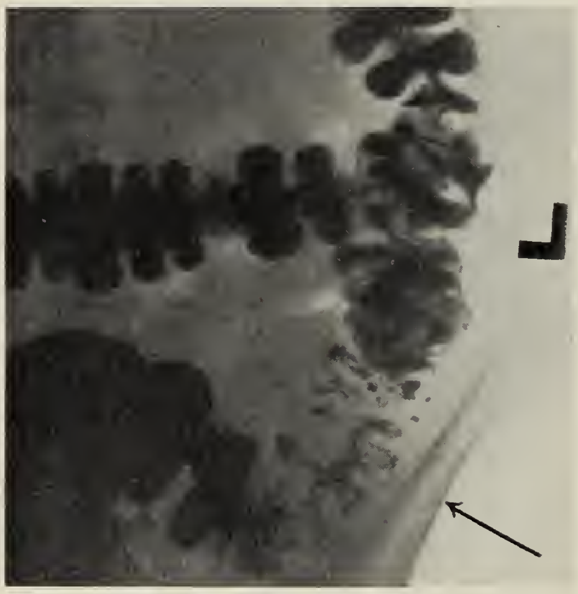

Fig. 1. Roentgenogram Showing Spastic Portion of Sigmoid with Extra-luminal Flecks of Barium Indicating Diverticulitis

Pollock states that carcinomatous diverticulitis cannot be distinguished from benign diverticulitis if the extralumenal shadows are present. The passage of blood in a case of diverticulitis should make one suspicious of cancer. Even at operation with the mass exposed it may be impossible to distinguish the two. Besides carcinoma, diverticulitis of the sigmoid may be confused with acute appendicitis, inflammatory conditions of the pelvic organs, ruptured duodenal ulcer and pancreatic disease. When there is doubt an exploratory operation is advisable.

In recent years there has been a marked trend toward conservative treatment of diverticulitis because of the numerous reports of cases which were entirely relieved by palliative measures, even though associated with an abscess. A bland diet, daily enemas to cleanse the inflamed colon, and mild saline laxatives to keep the feces semi-solid are the measures employed.

Telling and Erdman both advise operation in all cases in which the condition is recognized, but this view is entirely too radical. Resection under the best conditions has a mortality of at least ten per cent, which is about the same as for carcinoma. The acute cases are best treated by rest, application of an ice bag, morphine, restricted diet and relief of constipation. Even though perforation may occur palliative measures are still advised, because general peritonitis is a rare complication and the process tends to become quiescent.

When there is tumor formation some authors still advise conservative treatment even in the presence of an abscess. To attempt to close a diverticulous opening or to do a resection when a mass or abscess is present is subjecting the patient to the possible formation of a fistula and to the danger of general peritonitis. In the presence of an acute or chronic obstruction most writers advise colostomy with secondary resection some months later. Colostomy not only relieves the obstruction but, with daily flushing of the distal effected segment, allows the infection in and around the sigmoid to subside. Then resection and anastomosis can be done with comparative safety.

When a vesico-colic fistula exists colostomy is advisable because several cases have been reported in which the opening has closed spontaneously. If the fistula persists, the opening in the bladder can be closed, and at the same time the sigmoidal opening can be closed or the affected portion of bowel resected.

The Mikulicz operation in three stages is much safer than any one-stage resection. Mummery has advised permanent colostomy in some cases, being content with this procedure rather than risk the serious consequences of resection. When carcinoma is suspected serious consideration should be given to resection. A preliminary colostomy is indicated, and, if the tumor disappears with the cessation of symptoms, one is justified in assuming that cancer does not exist.

The following three cases are typical of the acute self-limiting diverticulitis of the sigmoid, confirmed by x-ray:—

Case 1. Obese male, aged 63 years. Had been suffering for two days with acute pain in left lower abdomen radiating to both groins and later to the right lower abdomen. Nausea, vomiting, constipation, fever, tenderness and rigidity present. Good recovery in three days, when patient took castor oil against advice, with a recurrence of the attack. No further trouble on medical treatment.

Case 2. Male, aged 45 years. Suffered with pain for twenty-four hours with nausea and vomiting. Marked constipation present. Patient is short of stature and weighs 185 pounds. Tenderness and rigidity present in left lower quadrant, with fever and leucocytosis. Symptoms subsided in four days. No further attacks.

Case 3. Female, aged 49 years. Complained of pain attacks in left lower abdomen for seven years, each of two to three weeks duration. Had one severe attack with vomiting. Indigestion present for many years with marked constipation and blood in stools for many years. Protruding hemorrhoids for many years. On advice had reduced weight from 163 lbs. to 141 lbs. by dieting. Examination showed tenderness in lower abdomen and absence of tumor. Proctoscopic examination showed large pedunculated polyp and internal hemorrhoids, accounting for blood in the stools. Still complains of some pain on medical treatments.

The following case is illustrative of the acute complicated type of diverticulitis of the sigmoid:

Case 4. Female, aged 63 years. Six months history of diffuse abdominal pain with belching, distention and constipation. Seen in acute attack of severe low abdominal pain of twenty-four hours duration, with fever, vomiting and difficulty getting bowels to move. Patient obese, weighing 165 pounds, short in stature, temperature 100.2° to 103.4°F. Large tender mass filled pelvis and extended half way to umbilicus on the left. Leucocytes number 22,000. Barium enema failed to pass the sigmoid. Operation revealed a large inflammatory mass composed of sigmoid, mesentery, uterus and adnexa, omentum and small intestines. Two loops of small bowel were freed from the mass and two large abscesses drained. The mesentery of the sigmoid measured 8 inches x 4 inches x 4 inches. On the seventh day a fistula in the small bowel developed, and later a left-sided pleurisy. Wound healed with cessation of drainage on the twenty-fifth day. Has remained well for two years.

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Science Series. No. 1.

THE FUNCTIONS OF THE LIVER

J. Markowitz, M.D.

Professor of Physiology, Georgetown University School of Medicine

The liver is the largest organ in the body, making approximately 2.5 per cent of the body weight. It is natural to suppose that it has a multitude of functions. Clinically it has been established since the time of Galen that it may be involved in certain types of jaundice and that serious disease of this organ is incompatible with life. Nothing definite, however, has been contributed by clinical observation to our knowledge of the exact functions of the liver. Generally speaking, observation of patients, while it may give useful hints about the activity of organs, rarely gives precise fundamental information. To obtain this it is essential to resort to the use of experimental animals. One method of studying function is to remove from a dog the organ in question and observe the animal by all the means at our disposal for the remainder of its life.

In the case of the liver it requires no great consideration to realize that the first problem confronting the investigator is to remove the organ without killing the animal immediately as a result of tying the portal vein and the inferior vena cava. Older investigators concluded that it was impossible to remove all of the liver of a dog, and they contented themselves with removing as many lobes as was consistent with an unobstructed portal and caval blood-flow. It soon became evident that the liver had such a large factor of safety that the animal made an uneventful recovery following the surgical removal of as much liver tissue as was possible in this manner. Such stumps of liver as were left quickly regenerated, and in a few weeks the liver was restored to its original size. Clearly, then, this was not the way to study the physiology of the liver, and means had to be devised for removing the whole organ. To Frank Mann of the Mayo Clinic belongs the great credit of being the first to achieve this successfully. He used what is today the rather obvious method of forcing a collateral circulation to develop before removal of the liver. He did this by partially ligating the inferior vena cava and the portal vein, with the result that at a final operation these vessels could be completely tied and the liver removed with the strip of vena cava that runs through it. His method of forcing the collateral circulation to develop involved the establishment of a reverse Eck fistula. Markowitz and Soskin simplified the technic for hepatectomy, so that the liver could be removed not only from dogs but from smaller animals, such as cats, guinea-pigs, rabbits and monkeys. It is by means of these surgical methods that we have been able to accumulate a very creditable story regarding the physiology of this organ. Comparatively few laboratories are investigating the physiology of the liver for the reason that its surgical removal even by the simplest methods available is not an easy procedure.

For a few hours after removal of the liver from a dog, the animal appears to be normal. It walks about the room and sniffs at by-standers and various objects it encounters. Soon, however, the animal begins to lose interest and lies down. Within another hour convulsions of an alarming nature manifest themselves. Examination of the blood-sugar at this stage reveals that instead of the normal value of 0.1 per cent, this value has dwindled to half or even less. Clearly the convulsions are hypoglycemic in nature, since as soon as the animal is given an intravenous injection of glucose (approximately one quarter gram per kilo.) the convulsions promptly subside; the animal becomes conscious and resumes interest in its environment. As the result of such experiments it has been possible to show that the liver is the only source of blood sugar in the fasting animal, the muscles rapidly using up what sugar there is in the blood after the organ has been removed. A certain minimum amount of sugar is absolutely essential for the well-being of the organism and has to be injected frequently. This function of supplying glucose to the blood to maintain its normal level is one that can be continued by artificial injection. Unfortunately, the other functions of the liver are not so easily reproduced, with the result that within twenty to forty hours the animal becomes moribund and dies in spite of the periodic injections of sugar.

During its life a very characteristic and invariable set of changes has been going on as a result of the hepatectomy. Of these the most striking to the unaided senses is the presence of intensive jaundice. The body fat and serous membranes are stained a deep yellow. The usually colorless plasma of a dog in six hours after hepatectomy becomes slightly jaundiced, and at the time of the animal's death is intensely so, giving a strong indirect van den Bergh reaction. This observation proves that bile pigment is not made in the liver but is excreted by this organ. The jaundice which occurs after hepatectomy is fully as intense as that following ligation of the common bile-duct.

After hepatectomy the protein metabolism becomes altered in several ways. In the first place, formation of urea ceases so that the blood and urine soon become free of this waste product. At the same time the concentration of amino acids in the blood and tissues increases steadily, indicating that formation of urea is in abeyance, because deaminization can not occur in the absence of the liver. From perfusion experiments on the liver it is safe to conclude that deaminization and the formation of urea actually occur in this organ. The unexpected observation was made that following hepatectomy the concentration of uric acid in the blood and tissues increased greatly. It was possible to show that uric acid is largely destroyed by the liver (being changed to allantoine in the dog).

The liver has been rightly suspected to be the source of fibrinogen. After hepatectomy there is a constant diminution in the fibrinogen content of blood. Apparently fibrinogen is a labile protein in the blood and is quickly exhausted unless it is replaced by the liver. McMaster and Drury succeeded in removing the liver in rabbits by a modification of the method of Markowitz and Soskin. Their liverless rabbits lived as long as forty hours, at the end of which time the fibrinogen content of the blood was very low. Normally, when the blood of a rabbit is defibrinated and thereby rendered incoagulable, the fibrinogen of the blood quickly reappears, reaching its normal value in about twenty-four hours. This is not the case when the blood of a liverless rabbit is defibrinated.

The liver is probably the source of acetone bodies. If the liver is removed from an animal at the height of ketosis this condition rapidly subsides.

This is not the place to discuss the detoxicating function of the liver. It would be surprising if a large, cellular organ like the liver did not possess this function, but the actual experimental evidence in its favor is very meager, because practically none of the experimenters have resorted to liverless dogs. It has been shown that the liver is very important in the detoxication of alkaloids.

The specific dynamic action of protein and the calorigenic action of epinephrine can not be demonstrated in the liverless animal.

The above findings have all been obtained by means of a preparation from which the liver has been completely excised without disturbing the animal in any other way. They illustrate the importance of a method in the study of physiology. The findings probably represent a small fraction of what will be learned in the next decade by means of the liverless animal.

ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"The Treatment of Essential Hypertension by X-Radiation of the Medulla Oblongata,"* by **Isadore Rodis**, M.D.

The treatment was based on the hypothesis that hypertension is the result of excessive stimulation of the vasomotor center. The idea originated with Dr. Wallace M. Yater. We may imagine the vasomotor center to be bombarded more or less continuously by stimuli which may be of sensory origin, of psychic origin, or both. Considered thus, hypertension may be merely an exaggeration of a normal mechanism. It was hoped that X-radiation over the site of the vasomotor center might result in a raising of the threshold of excitability without injury to the numerous and delicate nerve elements in the medulla. X-radiation of nerve ganglia has been used with some success in the treatment of angina pectoris, Raynaud's disease and the neuralgias. Unfortunately only patients in the stage of fixed hypertension were treated. It is believed that the most favorable time for beneficial results would be during that period when the blood pressure fluctuates greatly.

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* Presented December 16, 1931. Paper to be published elsewhere.

Eight patients were treated by Dr. Fred O. Coe. Three deep X-ray treatments were given in the suboccipital region at intervals of two weeks. The dosage was as follows: 200 K.V., 5 m.a., 40 minutes at 50 cm., using 0.5 cm. copper and 1 mm. of aluminum to an area approximately 5 cm. square. Epilation resulted in all cases but the hair grew back in normal fashion. Blood pressure readings were taken at weekly intervals and the periods of observation averaged six months. During the period of observation the patients carried on their usual activities and were not allowed any medication.

One patient stated that he had improvement in the severity of symptoms. Four cases showed an unquestionable downward trend in the heights of the blood pressures. In three other cases there was for several months a downward trend in the heights of the blood pressures but a later tendency to a return toward original levels. In the eighth case there was a tendency toward a slight increase in the height of the blood pressure. In other words, in seven out of eight cases there was a possible effect of the radiation upon the height of the blood pressures. At the end of the periods of observation, however, all of the patients still had hypertension.

The results are not particularly encouraging but it is proposed to continue this form of therapy experimentally with larger doses and from several portals of entry on patients in the fluctuating stage of hypertension who have been observed through a careful control period.

Discussion: Dr. Fred O. Coe and Dr. Wallace M. Yater.

"Case Report. An Ingested Rifle Bullet Removed from the Urinary Bladder,"* by **Dunlap P. Penhallow,** M.D., F.A.C.S.

The patient was admitted to Station Hospital in February, 1920, complaining of hematuria and pain at the end of micturition. In August 1919 he had accidentally swallowed a rifle bullet which he was holding in his mouth. The bullet was never passed, but various sequelae developed about three weeks after ingestion, such as pain on defecation and bloody stools. This lasted for about ten days, to be followed by a period of quiescence for three months and then by hematuria and pain at the end of micturition.

X-ray and cystoscopic examinations revealed a rifle bullet on the posterior wall of the bladder. This was removed by supra-pubic incision, March 8, 1920. The bullet was adherent to the posterior wall of the bladder and was covered with salts. Convalescence was uneventful.

The bullet was apparently caught in the transverse folds of the rectum and had gradually eroded through to the extraperitoneal space below the retrovesical fold of the peritoneum and the prostate. There were no signs of extravasation. The bullet was probably swallowed, since it would be difficult to pass a caliber 30 rifle bullet, which is the size of Fr. 24 sound, through the urethra. The fact that the bullet was adherent strengthens the theory that it passed through the route as described. If it had been passed through the urethra it would probably have been found lying free in the bladder. The slow penetration in the area described, which was entirely extraperitoneal, accounts for the lack of symptoms of extravasation. The wound probably healed as the bullet passed along.

The history and chronological sequence of events was extremely suggestive, and the fact that the bullet was probably ingested and took the route described could not be disproved.

Penhallow, D. P., Shrapnel Bullet in Bladder, Bost. Med. & Surg. Jour., 1916, Vol. 174, p. 131.

Discussion: Drs. Francis R. Hagner, H. A. Fowler and R. Arthur Hooe.

"Obstetric Analgesia,"* by **Radford Brown,** M.D.

The first attempts toward the relief of pain in labor were opposed by the religious elements as well as the medical profession of the day. An energetic campaign for painless childbirth was headed by Sir James Y. Simpson during the middle of the last century. A great impetus was given this cause by Queen Victoria in 1853 when she decided to have chloroform for the birth of her expected child. For the next fifty years, ether and chloroform were the mainstays in relieving part of the pain of labor. Nitrous oxide was first used by Klikowitch in 1880. "Twilight sleep" was introduced by Steinbückel in 1902. For the past ten years, considerable progress has been made toward the abolition of pain by the use of the barbituric acid group. The bulk of this work has been accomplished in Germany.

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* Presented October 14, 1931.

* Presented October 28, 1931.

The indiscriminate use of narcotic and hypnotic drugs is not without danger. There is a tendency to prolong labor which predisposes to infection and increases the incidence of operative interference.

The ideal obstetric analgesic should have the following qualifications: (1) it should be safe for the mother and child; (2) it should relieve the pain of labor or at least the remembrance of it; (3) it should not prolong labor; (4) its technic of administration should be simple. A drug fully meeting all these requirements has not yet been developed.

A short consideration of the various agents for the relief of pain in labor was given. The advantages and the limitations were reviewed of ether, chloroform, nitrous oxide, spinal and caudal and local anesthesia, rectal analgesia, avertin and the barbituric acid derivatives. Of the last group pernocton was considered the outstanding drug.

The abstracted review of pernocton given below was taken from the article "Pernocton as an Analgesic in Obstetrics and Gynecology" by Brown, Moloy and Laird, published in August, 1931, in the American Journal of Obstetrics and Gynecology.

Pernocton was used as an analgesic in 133 labor cases at Sloane Hospital for Women in New York City. The injections of the 10 per cent solution were given intravenously at the rate of 1 c.c. per minute. When labor was well established with strong uterine contractions at 3 to 5 minute intervals, the patient passed into what was apparently a normal sleep. There were occasionally moaning and restlessness during the contractions but in the intervals the patients rested quietly. Respiration, pulse and blood pressure were not affected adversely. Uterine contractions were affected in only a few instances and then for but a short time. Restlessness was the only undesirable feature. Three of the excitable patients required restraint.

The results in 37 per cent were very favorable, with a complete abolition of pain and complete amnesia; 62 per cent were recorded as moderately favorable with a partial amnesia and relief of pain. In one per cent there was no amnesia or relief of pain.

The average duration of labor in the primiparae was 18 hours and in the multiparae 7½ hours.

The babies were not affected, only 1 in the entire series requiring tubbing. There was 1 neo-natal death, following breech delivery; autopsy revealed a broken neck.

One maternal death occurred in the series. Autopsy showed an early bronchopneumonia, but the responsibility of pernocton as the cause was not entirely ruled out.

Since the above report was published, pernocton has been used in 800 additional cases at Sloane Hospital without mortality and with equally good results obtained.

Discussion: Drs. Herbert P. Ramsey, Prentiss Willson, A. Y. P. Garnett and C. L. G. Anderson.

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THE MEDICAL ANNALS OF THE DISTRICT OF COLUMBIA: GENESIS AND SCOPE

The year 1932 marks the birth of this publication. The Annals replaces the Bulletin but is really a continuation of the Washington Medical Annals, coming back to life after a period of eleven years. The following article written by Dr. John B. Nichols gives an epitome of the publications which the Medical Society of the District of Columbia has from time to time fostered. Dr. Nichols has also well stated the general purpose and value of a representive journal. The contents of the Annals will be somewhat as follows:

1. Selected papers and abstracts of papers presented before the Medical Society.
2. Reviews of various subjects and reports of recent advances in medicine, surgery and the specialties, to be designated "Science Series."
3. Transactions of special sections of the Society.
4. Editorials.
5. News of activities of organized medicine throughout the world.
6. Report of accomplishments of interest from local medical schools, hospitals, and government institutions, and also from the various smaller local societies.
7. Activities of committees and also individual members of the Society of general interest.

It is hoped that all members of the Society who present papers before the Society will prepare them carefully with the possibility of publication in the Annals in mind. If the paper is to be published in some other journal an abstract should be given to the editors after the paper is read. Members are warned that they may be disappointed by non-acceptance of their papers for publication, since all papers can not be used because of limitation of space. Likewise, papers may be cut ruthlessly by the editors' pencil if too long or in need of revision. Papers should be prepared according to directions given elsewhere in this journal. After editing, a corrected copy of the papers will be sent to the authors for approval. An attempt will be made to include the discussions of papers published.

Members of the Society are urged to take an active interest in their publication and to send to the editors all pieces of information which they think may be of interest to others.

Arthur C. Christie, M.D., *President.*
*Matthew White Perry, M.D., *Chairman, Committee on Publication.*
Coursen B. Conklin, M.D., *Managing Editor.*
Wallace M. Yater, M.D., *Editor.*

A BRIEF HISTORY OF THE PUBLICATIONS OF THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

John B. Nichols, M.D.

The business proceedings and scientific contributions of the Medical Society of the District of Columbia in the past have been published, irregularly and interruptedly, and in greater or less fullness, as follows:

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* Resigned; Dr. Yater successor.

The transactions of the Society for about 1869–71 were published in the second volume of the National Medical Journal (1871–72), an ephemeral local journal which expired with the second volume.

From 1874 to 1878 the Society published its own "Transactions," in quarterly numbers, arranged in five volumes.

The National Medical Review, a short-lived local journal of which only six numbers were published, 1878–79, presented some of the work of the Society of that period.

Walsh's Retrospect of American Medicine and Surgery, a quarterly published in Washington for three years, 1880–82, contained a few papers by local physicians, but the publication met with little favor and some active opposition, and did not have the official sanction of the Society.

From 1883 to 1885 the Maryland Medical Journal in its Volumes IX to XIII published for that period much of the proceedings of the Society under a definite arrangement.

In 1885 the Society made arrangements for publication of its material in the Journal of the American Medical Association, and this procedure was carried on through 1889, covering Volumes VI to XV (1886–90) of that journal.

From 1892 to 1901 the National Medical Review, a monthly periodical, was published in Washington under private ownership. This served during that period as the authorized vehicle for the publication of the material of the Society. Reprints from this journal were published separately as annual "Transactions" of the Society, in six volumes, from 1896 to 1901.

Under the initiative and vigorous editorial management of Dr. Daniel S. Lamb the Washington Medical Annals was published by the Society as its property and official organ from 1901 to 1920, nineteen volumes in all, in bimonthly numbers. It had a flourishing existence until it gradually expired during the disturbances of the World War. Volume XVII, 1918, consisted of only four of the regular six numbers; Volume XVIII, 1919, comprised only two numbers; Volume XIX was represented by only the last number published, that for January, 1920. During its existence the Annals constituted a presentation of scientific material of substantial value and creditable to the local profession. It will abide as one of the monuments of the labor and service rendered by Doctor Lamb in behalf of this Society.

Since 1924 the monthly Bulletin of the Society (in printed form since January, 1929), issued by its Secretary, Dr. Coursen B. Conklin, has conveyed brief accounts of the activities of the Society.

For a period of a quarter of a century from 1892 to 1917 the proceedings of the Society were continuously published in adequate and creditable form. For the past twelve years and more, during a period of unexcelled prosperity, it has lacked a published record of its activities, and much valuable material has passed into oblivion. Many of the membership are not interested or impressed by such publication, or cavil at it, or object on the ground of expense. Nevertheless, there are many practical advantages and spiritual values to be gained thereby, which in the estimation of many far offset sordid and niggardly considerations of cost.

The publication of the proceedings affords a wider dissemination of valuable scientific contributions, reaching not only those present at the meetings but also the entire membership and the profession in general. At a small extra cost the material developed by the expensive upkeep of the Society reaches a greatly multiplied audience. Useful contributions are preserved for permanent reference and use, and are embodied in the general medical literature. It affords a ready and creditable vehicle for publication of papers, and is hence a convenience for the authors, a partial recompense for their labors, and a stimulus to the production of good work. It is perhaps a duty which the Society owes to the medical and general public to make available to the world its contributions to medical and sanitary science; and a duty which it owes itself to display its work and achievements for the appraisal and approval of the world.

The published transactions of a society like this serves as a permanent and accessible repository of valuable historical material. The affairs and activities of the Society, its personnel, official addresses and reports, memorials, biographic information, and the like, are matters which will be of untold interest and value to future generations. Some memory and record of our pitifully evanescent lives, some name and remembrance of our doings, can thus be preserved for an interested posterity. The honorable part which this Society plays in the advancement of medical science and in the history of the capital of our great country could be thus displayed to the world and preserved for the future.

The publication of a Society periodical would be another strong influence to enhance the esprit, the solidarity, the power, and the prestige of the medical profession of this national community, thus supplementing the inspiriting influence afforded by the construction of our Home and the institution of the Davidson Lectureship. In a society like ours the whole can be greater than the sum of all its parts; the association can engender an added complement of spirit and power which reflects back to and affords added benefits to each individual member. Every agency that can contribute to this result is thoroughly worth while.

It would be altogether felicitous and auspicious for the Medical Society of the District of Columbia again to engage in the publication to the world of its activities and proceedings in an ample and creditable manner.

HANDLING THE CANCER PROBLEM

That cancer is a major problem involving the public health stands out very urgently when we review the high and advancing death rate from this group of diseases. In 1929 a total of 111,569 persons died from cancer in the registration area of the United States. This is equivalent to a death rate of 96 per hundred thousand of population. In 1900 the rate was 63. Even since 1920 the death rate has increased from 83.3. Stated differently, it appears that whereas 630 people died from cancer in each million of population in 1900, 960 died in 1929. Cancer stands now as the second major cause of death, rising from sixth place twenty years ago.

Study and investigation in this field have increased as the importance of the subject became more and more realized. Greater efforts have been, and are being, made in research directed at discovery of the cause or causes of cancer, or at the discovery of some factor which may be held responsible for the unrestrained cell growth exhibited by cancer tissue and from which principles of prevention or cure may ultimately be evolved. Likewise there has been tremendous advance made in research and study in the purely therapeutic field. It is perhaps probable that in no other field in medicine is more attention being given in these respects to a single problem. The discoveries in the field of irradiation, and application by means of radium and X-rays of these discoveries to treatment of cancer, have come about entirely during this period; likewise improvement in surgical technique. In both fields the advances have been far-reaching.

From this concerted attention to malignancy, aside from the purely scientific aspects of the advances made, certain very definite facts have been evolved, which, if kept constantly in mind by the medical profession as a whole, promise to go far in reducing the present high mortality.

Analysis of results in treatment, as reported by groups eminently qualified in treatment, indicates that cancer is not necessarily the hopeless disease it is supposed to be, by either the medical profession or the lay public. Especially does this apply to cancer of the accessible sites. Involved in this is the dictum of early diagnosis and early treatment. One authority refers to the possibility of cure of seventy per cent of breast cancers under conditions of early diagnosis and early treatment. Likewise is the outlook more hopeful in the majority of cases of cancer of the skin, and in a large proportion of cases of cancer of the cervix. Cancer of other sites is more amenable to successful treatment at the present time, or at least to palliation well worth while, than is generally supposed.

It is agreed that successful treatment of cancer lies solely within the fields of surgery and irradiation. The choice of either of these fields in reference to the individual case is a matter calling for skilled medical judgment, and success in treatment depends on the choice, varying with the type, location and stage of the cancer to be treated. It follows that the best results in treatment, in keeping with proven possibilities, cannot be obtained by resorting to either surgery or irradiation alone as the method of choice for treating all forms of cancer; surgery being the indication in some cases, irradiation in others, while a combination of the two gives the best results in many types.

That efficient management of malignancy cases calls for a high order of grouped specialized ability is the opinion of those best qualified to offer opinion in this field. The complexity of the field, involving as it does, practically all phases of medicine, necessitates that the treatment of a case of cancer no longer may properly be considered a one man responsibility. Efficient service may be given only by a grouping of the work of the surgeon, of the radiologist and of the pathologist as a nucleus in setting up treatment facilities. This explains the concentration of treatment facilities evident in this field in recent years. More and more do we observe the development of special cancer institutes, the organization of special cancer services in the large hospitals, and the establishment of group clinics in the smaller institutions. It is highly probable that, only when this movement is well advanced throughout the country, will a real beginning in reduction of mortality from malignancy be made.

Necessarily the general practitioner occupies still the most responsible position in respect to clinical cancer, inasmuch as it is to him that the majority of cases first appeal. It is to be admitted, however, and this without reflection upon the ability of the general practitioner, that he is in the main not equipped to meet the demands placed upon him in respect to diagnosis and treatment. His responsibility, however, is to become more cancer-minded, that potential and actual cases of malignancy be recognized in their early stages and promptly transferred to hands adequately equipped in respect to diagnosis and treatment.

TWO YEARS OF ENFORCEMENT OF THE "HEALING ARTS PRACTICE ACT"

William C. Fowler, M.D.

Secretary-Treasurer, Commission on Licensure, D. C.

"An Act to regulate the practice of the healing art to protect the public health in the District of Columbia" was approved February 27, 1929. Under the provisions of the Act a Commission on Licensure is created. This Commission, in addition to licensing persons to practice the healing art in the District of Columbia, is authorized and empowered to establish minimum standards of pre-professional and professional education in the healing art and for hospitals for intern training. It is further authorized to redetermine from time to time the standing of any school or hospital.

The law also provides for the appointment by the Commission, of a board of examiners in the Basic Sciences, a board of examiners in Medicine and Osteopathy, a board of examiners in Chiropractic, a board of examiners in Naturopathy and such other boards of examiners in drugless healing as the Commission deems proper.

The Act, in definite terms, specifies that the Commission on Licensure shall consist of five members as follows: President of the Board of District Commissioners (Dr. Luther H. Reichelderfer); The United States District Attorney (Honorable Leo A. Rover); The United States Commissioner of Education (Dr. Wm. J. Cooper); The Superintendent of Public Schools of the District of Columbia (Dr. Frank W.

Ballou); and The Health Officer of the District of Columbia, each ex officio.

The first meeting of the Commission was held March 25, 1929, and since that time 48 other meetings have been held. After the Commission was duly organized it appointed boards of examiners in the Basic Sciences, in Medicine and Osteopathy and in Chiropractic. As no need for the appointment of a board of examiners in Naturopathy has thus far arisen, the appointment of such a board has been deferred. The following comprise the various boards:

Basic Science Board:
Dr. Paul Bartsch, Chairman
Dr. James P. Leake, Secretary
Dr. Maurice I. Smith
Dr. Wm. F. Holton
Dr. George W. McCoy

Medicine and Osteopathy Board:
Dr. Daniel L. Borden, Chairman
Dr. Gregg C. Birdsall, Secretary
Dr. Caryl Burbank
Dr. Howard F. Kane
Dr. Chester D. Swope

Chiropractic Board:
Dr. H. D. Norton, Chairman
Dr. Marguerite Dunnigan, Secretary
Dr. Hubert D. Roberts

Under the provisions of the Act all persons licensed to practice medicine and surgery in the District of Columbia under the Act of June 3, 1896, are required to apply for and obtain a new license; this license to be granted without examination and upon the payment of a fee of $1.00. The law also provides that all persons engaged in the practice of Osteopathy, Chiropractic, Naturopathy or other drugless healing, January 1, 1928, may be granted licenses without examination on the basis of years of practice in their respective systems of the healing art in the District of Columbia, and a fee of $25.00 is fixed to be paid for each such license.

Each applicant for a license to practice the healing art in this District after examination must submit with his application proof satisfactory to the Commission on Licensure that he is not less than twenty-one years of age; that he is of good moral character; that he has had not less than two years of pre-professional education and training in a college or university acceptable to the Commission before entering on the study of the healing art; that he has studied the healing art through not less than four graded courses of not less than nine months each, in a professional school of a standing recognized by the Commission, and has been graduated by such a school with the degree of Doctor of Medicine, Doctor of Osteopathy or some equivalent degree.

Every applicant for a license to practice the healing art in this District after examination, must first be referred to the Board in the Basic Sciences for examination. If he fails to successfully pass that board he is not permitted to enter the subsequent examination before the boards in Medicine and Osteopathy, Chiropractic, Naturopathy, etc.

Since the organization of the Commission on Licensure, 2,113 applications have been received as follows:

1,316 for renewal of license without examination.
67 for license to practice Osteopathy without examination and on the basis of years of practice.
274 for license to practice Chiropractic without examination and on the basis of years of practice.
54 for license to practice Naturopathy without examination and on the basis of years of practice.
1 for license to practice Naprapathy without examination and on the basis of years of practice.
172 for license to practice Medicine after examination.
1 for license to practice Osteopathy after examination.
1 for license to practice Chiropractic after examination.
51 for license on the basis of reciprocity.

Licenses have been issued as follows:

1,302 to practice Medicine without examination.
97 to practice Medicine after examination.
35 to practice Medicine on the basis of reciprocity.
4 to practice Osteopathy on the basis of reciprocity.
65 to practice Osteopathy without examination.
264 to practice Chiropractic without examination.
1 to practice Naprapathy without examination.

The 35 reciprocity licenses issued were as follows: Virginia, 5; Maryland, 11; Pennsylvania, 3; California, 2; Kentucky, 1; New Hampshire, 1; New Jersey, 1; North Carolina, 3; Illinois, 1; West Virginia, 3; Minnesota, 1; New York, 1; Michigan, 1; Iowa, 1.

Reciprocity licenses have been refused for various reasons in 16 instances.

One license was revoked after the holder was convicted of violation of the Harrison Narcotic Act.

Examinations for licenses are held semiannually in January and July. At the examination in the Basic Science Subjects held in July, 1929, 40 applicants entered and 5 failed. At the examination held January, 1930, 23 entered and 6 failed. At the examination held July, 1930, 18 entered and 8 failed. At the examination held January, 1931, 10 entered and 5 failed. At the examination held July, 1931, 26 entered and 12 failed.

The fee for examination is $25.00; for reciprocity $50.00 and for certification of license to another jurisdiction $10.00.

The total number of licenses issued is as follows:

Medicine and Surgery	1,399
Osteopathy	61
Chiropractic	264
Naturopathy	48
Naprapathy	1
Total	1,773

As an indication of the character of the questions asked at examinations the following is given:

ANATOMY

Six (6) out of the nine (9) questions are to be answered: 2 out of 3 in gross anatomy, 2 out of the 3 in histology, and 2 out of the 3 in embryology.

GROSS ANATOMY

1. Give a brief account of the uterus: its structure, attachment, topography, and periodic changes.
2. Describe the pharynx, giving the structure of its wall, its relations, attachments, and communications.
3. Describe the wrist joint.

HISTOLOGY

1. Give the histology of the heart.
2. What covers (a) the tooth, (b) stomach, (c) bladder, (d) mesentery, (e) kidney?
3. What lines (a) Bowman's capsule, (b) fallopian tube, (c) gall cyst, (d) trachea, (e) spinal canal?

EMBRYOLOGY

1. Discuss the "primitive layers" in the embryo.
2. Describe the formation of the placenta.
3. What organs of the adult are developed in part from the gill structures of the embryo?

PHYSIOLOGY

Answer five questions out of the six

1. Describe the normal emptying of the stomach and the control of the pyloric sphincter.
2. Outline current views of the function of the adrenal bodies.
3. How does atmospheric humidity influence body temperature?
4. How does vagus stimulation affect the function of the stomach?
5. What are the effects of the complete removal of the thyroid gland?
6. In what way does the respiratory movement affect the circulation of the blood?

PATHOLOGY

Answer five of the seven questions

1. Describe the changes found, and the manner of their production, in a fatal case of coronary thrombosis.
2. In what organs, and in what parts of these organs, would you look for pathological evidence (a) of acute alcoholism, (b) of chronic alcoholism? List the answers to each question in the order of their importance.
3. Give the pathological changes in pernicious anemia.
4. List the diseases of the kidney in their relative order of frequency as found (a) clinically, (b) at autopsy.
5. Describe the pathology of acute poliomyelitis.
6. Where do secondary growths form in cancer of the stomach? List in the order of their probable recognition before death.
7. What are the chief postmortem evidences of death: (a) from protein shock, (b) from carbon monoxide poisoning, (c) from lethargic encephalitis? (d) What permanent deformities are most liable to occur after fracture just above the wrist, (e) after fracture of the neck of the femur?

BACTERIOLOGY

Answer five of the six questions presented

1. How would you stain smear specimens to demonstrate the following organisms: acid fast bacilli, gram-positive organisms, malaria parasites, diphtheria bacilli, and gonococci?
2. Discuss the tetanus organism, giving morphology, cultural reactions, pathogenicity (including mode of action). Discuss the clinical aspects of passive immunity in tetanus.
3. Name and discuss, from the point of view of etiology, three diseases of animals that are commonly communicated to men.
4. Discuss the bacteriology of tularemia. What are the usual sources of human infection in tularemia, and how is the disease transmitted?
5. Discuss the agglutination reaction in diagnosis, with particular reference to three diseases in which it is of great value.
6. Discuss serological groups as applied to pneumococci and meningococci.

CHEMISTRY

Answer any six of the following questions

1. Name the principal chemical properties of d-glu-cose, and explain them as far as possible on the basis of its chemical constitution.
2. Discuss the origin of the uric acid found in urine. Place the following foods in the proper order with respect to their content of uric acid precursors: white bread, milk, meat, and liver.
3. Discuss the structure of the protein molecule, and illustrate by writing the structural formula of some one tripeptide containing three different amino acids.
4. State briefly the principles involved in the following analytical methods: (1) Kjeldahl, (2) qualitative determination of the sugar in the urine by the use of either Fehling's or Benedict's method, (3) urease method for urea.
5. Discuss briefly the chemistry and metabolism of creatine and creatinine in the normal human adult.
6. Distinguish between the nature and action of hormones and enzymes. Give examples of each.
7. Define or explain the following terms and illustrate each: (1) iodine number of a fat, (2) law of mass action, (3) isoelectric point, (4) normal solution, (5) buffer solution.
8. Compare the action of the phosphates, bicarbonates, and proteins in neutrality regulation.

PRACTICE OF MEDICINE

The applicant is required to answer the first five questions. Any five of the remaining ten may be answered to complete the examination.

1. Etiology, symptoms and diagnosis of Aneurism of the descending portion of the Thoracic Aorta.
2. On what facts would you base your prognosis of chronic renal disease?
3. (a) Give a clinical classification of diseases of the Thyroid. (b) Symptoms of Thyrotoxicosis.
4. Symptoms, diagnosis and treatment of Encephalitis Lethargica.
5. Symptoms and diagnosis of Hodgkins Disease.
6. Diagnosis of Aortic Stenosis.
7. Differential diagnosis between left pleural effusion and massive collapse of the lung (same side).
8. Etiology, symptoms and signs of Solitary Abscess of the Liver.
9. Period of Incubation, symptoms and clinical course of Variola.
10. Symptoms, diagnosis and treatment of Broncho-pneumonia in a child six years of age.
11. Incubation, clinical course and complications of Scarlet Fever.
12. Etiology and symptoms of Yellow Fever.
13. Name the various modes of onset of Chronic Pulmonary Tuberculosis.
14. What is a Megaloblast, (b) Myelocyte, (c) Reticulocyte, (d) Anisocytosis, (e) Poikilocytosis?
15. Describe the parasite of aestivo-autumnal malaria and treat such a case.

SURGERY

Answer the first five questions and any five of the remaining ten

1. Give five cardinal symptoms of inflammation.
2. Discuss the treatment of septicemia.
3. Give the symptomatology of a Colles' fracture.
4. Give the four cardinal reasons for surgical interference in duodenal ulcer.
5. Give the treatment of diabetic gangrene involving the toe of the foot.
6. Discuss treatment of acute appendicitis.
7. Give the cardinal symptoms of exophthalmic goiter.
8. Describe the closed method treatment of empyema.
9. Describe the method of reducing an anterior dislocation of the shoulder.
10. Give treatment of surgical shock.
11. Give the technique of spinal anesthesia.
12. Classify inguinal hernias.
13. Give diagnosis of fracture of the base of the skull.
14. Give prophylactic treatment of tetanus.
15. Describe technique of indirect transfusion.

OBSTETRICS AND GYNECOLOGY

1. Give an histological description of the endometrium in the resting stage.
2. Outline the correct care of a pregnant woman from the 3d month until labor begins.
3. Give the etiology and treatment of postpartum hemorrhage.
4. Give the symptoms, prognosis and treatment of hydatidiform mole.
5. Give the diagnosis and management of a right mento-posterior presentation, labor in the second stage.
6. Define external cephalic version and give its indications.
7. Give the management of a neglected transverse presentation with prolapse of the arm, living baby, in a primipara, with fever: A. Age 20; B. age 40.
8. Give the differential diagnosis between endocervicitis and carcinoma of the cervix.
9. Name the factors concerned in maintaining the uterus in its normal position.
10. Outline the treatment of acute pelvic infections.

PROGRAM, SOCIETY ACTIVITIES, JANUARY, 1932

January 13—Memorial Ceremonies for the late Dr. George Martin Kober. It is anticipated that representatives from the Washington Anthropological Society, the Board of Public Welfare of the District of Columbia, the United States Army, and the Association for the Prevention of Tuberculosis of the District of Columbia, will participate. Dr. W. Coleman Nevils, S. J., will represent Georgetown University. Doctor Kober's life was so intimately associated with the organizations above listed that it was deemed proper and fitting that they, jointly with representatives from the Medical Society of the District of Columbia, should pay this final tribute.

January 20—1. Dr. Hugh H. Trout, President of the Southern Surgical Association and Chief Surgeon of the Jefferson Hospital of Roanoke, Virginia. Subject: "The Surgical Release of Pericardial Adhesions," illustrated by motion pictures.

2. Dr. Laszlo Detre, noted bacteriologist and immunologist of Hungary: "The Detection of Tubercle Bacilli in the Circulating Blood."

January 27—Program to be furnished by the Washington Society of Pathologists. This Society, which meets once a month at the Army Medical Museum, is composed of physicians of the Army, Navy, Public Health Service and the civilian medical schools who are interested in the study of gross and microscopic pathology.

PROGRAM OF THE SOCIETY OF HOSPITAL INTERNS OF THE DISTRICT OF COLUMBIA FOR JANUARY*

The meetings of the Society of Interns are held on specified Wednesdays at 7.00 P.M. All members of the Medical Society are invited.

January 13. Use and Abuse of the Catheter. Dr. Francis R. Hagner.

January 20. The Doctor from the Patient's Viewpoint. Mr. Stephen E. Kramer, Assistant Superintendent of Public Schools, Washington, D. C.

Dr. Laszlo Detre

Announcement is made that Dr. Laszlo Detre, who is to present a paper before the Society on January 20, 1932, is to make Washington his home. Dr. Detre, the son of a district physician in Surany, Hungary, is well known in medical scientific circles. His medical education was obtained in the University of Budapest following his graduation. He spent some time doing research work in the laboratory of Professor Metchnikoff in the Pasteur Institute in Paris, later becoming assistant professor (privat-dozent) of bacteriology in Budapest. From 1903 to 1914 he was Chief Physician of the tuberculosis dispensary of the Budapest Polyclinic. In 1908 he was Hungary's official delegate to the Washington Tuberculosis Congress. Doctor Detre served eminently during the World War and directed the fight against the epidemics of typhus fever, cholera and dysentery in Hungary. Since 1919 he has been Chief Bacteriologist of the Hungary Serum Institute.

Of his many scientific contributions the most important were his theory of the origin of typhoid antibodies (1898), the use of blood for medico-legal purposes (1900), the development of the first potent serum against anthrax (1902) and of blackleg fever (1905), the discovery of antigens and antibodies in syphilis in human cases almost simultaneously with the announcement of Wassermann's discovery of his test for syphilis (1906), the use of differential cutaneous reactions for determining infection by human or bovine strains of tubercle bacilli (1907), and the discovery of a new zonal phenomenon in agglutination (1926). Dr. Detre was the first to use the term 'antigen' (1898).

The International Medical Club

Dr. J. G. Lewis, formerly of Panama, was the guest of the International Medical Club, at luncheon on Monday, December 14, 1931, at the Carlton Hotel. Doctor Lewis addressed the Club on "The Medical Aspects of the Nicaraguan Earthquake." Doctor Lewis, who was assistant surgeon at the Santo Tomas Hospital in Panama, was appointed head of the medical relief and was one of the first to reach the stricken area. The Ambassador of Mexico and the Ministers of Nicaragua and El Salvador were also present.

Officers nominated for the coming year are as follows: President, A. B. Bennett; First

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* In affiliation with the Medical Society District of Columbia.

Vice President, Arthur C. Christie; Second Vice President, Walter Teichmann; Third Vice President, Joseph S. Wall; Secretary, P. S. Constantinople; Treasurer, Tomas Cajigas; Historian, D. P. Penhallow. Board of Directors—Henry C. Macatee, Wm. Earl Clark and Charles S. White.

The Woman's Auxiliary to the Medical Society of the District of Columbia

(*Mrs. E. R. Whitmore, Chairman, Publicity Committee*)

Mrs. Walter Jackson Freeman, of Philadelphia, National President-Elect of the Woman's Auxiliary, who went to Europe in July, has been detained in Munich by the illness of her son, but is expected to return by the end of the year.

The Woman's Auxiliary to the Kentucky State Medical Society has several interesting features, such as study of the medical and health laws of the State, use of the National Auxiliary study programs, and review of Gossett's "What the Public Should Know About Childbirth." Each month, a ten-minute health talk is given from four broadcasting stations, by physicians of the Kentucky State Medical Society.

The Woman's Auxiliary to the Florida State Medical Society has given a report of the Philadelphia Convention in the Journal of the Florida State Medical Society.

The Woman's Auxiliary to the California Medical Association has suggested two eight months' programs, especially suited for auxiliaries where there are County Health Units, the talks being given by different speakers, many of them from the local medical profession.

The Woman's Auxiliary to the Medical Society of Virginia is presenting a series of four articles on the National organization of the Woman's Auxiliary.

The Woman's Auxiliary to the Tennessee State Medical Society promotes a radio health talk every week, the talk being obtained from the American Medical Association in Chicago, and given by a physician of the State Medical Society.

Post-Graduate Instruction

Professor Georges Portmann, Professor of Oto-Laryngology and Rhinology of the University of Bordeaux, France, will give an intensive course of one week in Washington, D. C., the week of February 1, 1932. Address inquiries to Dr. James A. Flynn, 1511 Rhode Island Avenue, N. W.

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The following reprints have recently been received for which due acknowledgment is made:

"Shakespeare's Knowledge of Medicine," General Magazine and Historical Chronicle, April, 1930, by Wm. Gerry Morgan, M.D.

"The Diagnosis of Pericardial Effusions," Virginia Medical Monthly, August, 1931, by Wallace M. Yater, A.B., M.D., M.S., and Samuel Dessoff, B.S., M.D.

"The Case For and Against the Operative Treatment of Angina Pectoris," American Journal of the Medical Sciences, July, 1931, by Wallace M. Yater, M.D., and Arthur P. Trewhella, M.D.

"Cyst of the Pericardium," American Heart Journal, June, 1931, by Wallace M. Yater, M.D.

"The Tachycardia, Time Factor, Survival Period and Seat of Action of Thyroxine in the Perfused Hearts of Thyroxinized Rabbits," American Journal of Physiology, September, 1931, by Wallace M. Yater, M.D.

"Tumors of the Heart and Pericardium," Archives of Internal Medicine, October, 1931, by Wallace M. Yater, M.D.

"Physical and Chemical Changes of Spinal fluid as Diagnostic Aid for Spinal Tumors," Pennsylvania Medical Journal, October, 1931, by Philip Jaisohn, M.D.

"The Eustachian Tube: Its Relation to Nasopharyngeal and Middle Ear Diseases," Southern Medical Journal, October, 1931, by Earle G. Breeding, M.S., M.D., F.A.C.S.

"Auricular Flutter and Complete Heart Block: With Restoration of Sinus Rhythm and A-V Conduction," Annals of Internal Medicine, October, 1931, by Leslie T. Gager, M.D.

"Agranulocytosis—Report of Case With Three Relapses," Virginia Medical Monthly, September, 1931, by Carl Goldenberg, M.D.

"Secondary Tonsillar Hemorrhage," The Laryngoscope, April, 1931, by James H. Earley, M.D.

TUBERCULOSIS ABSTRACTS

This Review Issued Monthly by the National Tuberculosis Association is Furnished by the Association for the Prevention of Tuberculosis of the District of Columbia.

VOLUME V JANUARY, 1932 NUMBER 1

SANOCRYSIN (sodium-gold-thiosulphate), was announced by Møllgaard in 1924. Clinical observations of the effect of the drug, published by numerous European writers since then, have been decidedly variable. Generally speaking, favorable results have been reported of cases with the exudative type of lesion, while little clinical improvement has been noticed in cases of the chronic type. Since some of the clinical reports do not seem to justify the conclusions drawn, a group of investigators in the William H. Maybury Sanatorium in Michigan decided to make an intensive study of the effect of sanocrysin on a small, carefully selected, closely comparable group according to a prearranged plan. Results of the study were published in the October, 1931, American Review of Tuberculosis, of which the following is a brief abstract.

A TRIAL OF SANOCRYSIN

Møllgaard claimed that sanocrysin has a specifically curative effect on tuberculosis. He believed that the drug, introduced into the blood stream, permeates tuberculous lesions and there kills many, if not all of the tubercle bacilli. Exudative, not too acute, pulmonary lesions of early age, being more pervious than the fibrous type, were considered more responsive to treatment. The fever, albuminuria, eruptions, and loss of weight resulting from the treatment were attributed to the liberation of toxins from the disintegrated bacilli. To offset the ill effects, an anti-serum was developed, and this was administered at the first sign of reaction, namely, albuminuria.

Other workers used the drug, as well as various other gold compounds, in human cases. The amount of gold in these compounds varies greatly; sanocrysin contains 37.4 per cent of gold. The present consensus of opinion seems to be that the chemical is not a specific bactericide, that nevertheless favorable responses sometimes occur, and that the toxic properties of the drug compel consideration. Metallic poisoning, rather than tuberculin-like shock, seems to account for the unfavorable reactions; consequently, Møllgaard's anti-serum has been discarded by most clinicians and smaller doses of sanocrysin are given.

PLAN OF TRIAL

The treatment was explained to a group of patients of the William H. Maybury Sanatorium. The 24 patients who were finally chosen from among the volunteers were all in good general condition who would, therefore, not be likely to suffer ill effects from the drug. Most of them had benefited to some extent by the routine sanatorium treatment, but the healing of their disease was slow and incomplete. The lesions were chiefly of the exudative and mixed exudative-productive types. All were free from complications.

On the basis of clinical, X-ray and laboratory findings, the patients were then divided into two equal and comparable groups, cases being matched one with another as closely as possible. By a flip of the coin, Group I was designated as the sanocrysin-treated and Group II as controls. The patients themselves were not aware of any distinction in treatment.

METHOD OF OBSERVATIONS

The patients were put to bed for a month prior to starting any medication, during which time uniform data and information were collected to serve as a basis of comparison. The preliminary thirty days' study was carried out in the following manner:

1. The chest was examined biweekly particularly to determine any variation in the extent or distribution of the râles, the findings being described in the record.
2. The chest was X-rayed (stereoscopic) at the beginning and at the end of the month and the films preserved, special notes of any changes being recorded.
3. Careful records of the presence and clinical course of complications and symptoms were made.
4. The sputum was weighed daily, and this figure was charted; also averaged at the end of the month.
5. The sputum was examined microscopically every two weeks to determine the presence of tubercle bacilli. A method of sputum concentration and animal inoculation was used routinely when indicated.
6. Body weight was measured and recorded weekly.

At the end of this preliminary checking, the same routine was continued during the period of the trial, except that physical examinations were done more frequently, particularly to show the presence and behavior of perifocal reactions, and stereograms of the chest were made monthly, oftener in cases showing rapid change.

Each patient receiving sanocrysin (Group I) was started with 0.1 mg. of the drug, dissolved in 2 cc. of distilled water and injected into a cubital vein. At intervals of four days, unless contraindicated, additional injections were given, increasing by 0.1 gm. up to 0.3 gm., and then increasing to 0.5 gm. The amount of distilled water was increased to 5 cc. when the dose of sanocrysin exceeded 0.3 gm. The 0.5-gm. dose was then repeated until the course was completed. The number of injections varied from nine to fourteen, and whenever there was a suspicion of a dangerous reaction the next dose was reduced, omitted or postponed. The total amount of sanocrysin administered to single patients varied from 3.1 to 6.1 gm., while the total amount per kgm. of body weight varied from 0.6 to 0.1 gm. The patients treated as controls (Group II) each received 14 intravenous injections of distilled water (2 cc. each) at intervals of four days.

EFFECTS OF TREATMENT

The detailed effects on the tuberculous conditions are minutely described in the article. The observations include the effect on temperature, pulse, lassitude, body weight, cough, sputum, appetite, sleep, physical findings, pain in chest, hemoptysis, dyspnea. Similarly, the toxic effects referable to the drug are noted as these affected the skin, nerves (neuritis), mucous membrane, eye, gastrointestinal tract, liver, kidney, etc. Laboratory evidences were as carefully and as fully studied. The study lasted approximately six months, during the first two of which sanocrysin treatment was given. During the entire period of the trial, both groups were kept in bed.

A follow-up of patients was instituted one year after the close of the study. In finally determining the effects of the treatment, all the observations were correlated. Chief reliance was placed on such factors as changes in the X-ray shadows of pulmonary lesions, presence or absence of tubercle bacilli in the sputum, measurable symptoms such as temperature, and fluctuations in body weight. Changes in physical signs were not given much value. Toxic effects of the drug were distinguished as far as possible from symptoms referable to the disease itself. A summary of the results is as follows:

	Group I (Sanocrysin)	Group II (Control)
Number	12	12
Slightly improved	5	6
Much improved	1	1
Unchanged	0	3
Slightly worse	1	1
Much worse	4	
Slight toxic effect	8	
Severe toxic effect	3	
Fatal	1	

CONCLUSION

"1. This investigation proves the need and the merit of a carefully prearranged plan to be followed in a clinical test of a chemotherapeutic agent in tuberculous patients.

"2. We discovered no evidence in 12 cases, studied according to such a plan, that sanocrysin, given in small, gradually increasing doses up to a total of 6.1 gm., has a beneficial effect on pulmonary tuberculosis or its complications.

"3. Compared with 'control' cases, more of our sanocrysin-treated cases became worse. The evidence is strongly suggestive that sanocrysin was at least partly responsible for the unfavorable trend of the disease in some of these cases.

"4. Sanocrysin exerted definitely harmful systemic effects in all our treated cases, partly as a secondary result of its action on the local tuberculous lesions, but mostly, we believe, by virtue of its own inherent toxicity. These effects were usually on the nutrition, gastrointestinal function, temperature, skin, mucous membranes and kidneys.

"5. One sanocrysin-treated patient died from parenchymatous degeneration of the liver and other effects which we interpret as gold poisoning. We could not anticipate this unfortunate outcome.

"6. Because of the lack of definite evidence of benefit and because of positive evidence of harm which in some respects is long-lasting, especially in the kidneys, the use of sanocrysin, as we used it, is not justified."—*Sanocrysin in Pulm. Tuberc., J. Burns Amberson, Jr., B. T. McMahon, and Max Pinner, Am. Rev. of Tuberc., Oct., 1931.*

PROPOSED LEGISLATION AFFECTING THE MEDICAL PROFESSION IN THE DISTRICT OF COLUMBIA

S. 2146—A bill, introduced by Mr. Frazier, North Dakota, to prohibit experiments upon living dogs in the District of Columbia and providing a penalty for violation thereof.

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That from and after the passage of this Act it shall be a misdemeanor for any person to experiment or operate in any manner whatsoever upon any living dog, for any purpose other than the healing or curing of said dog, in the District of Columbia.

That any person convicted of a violation of this Act shall be sentenced to pay a fine of not less than $1C0 nor more than $500, or to undergo imprisonment for a term of not less than three months nor more than one year, or both such fine and imprisonment.

That all Acts or parts of Acts inconsistent herewith are hereby repealed."

S. 203—Introduced by Senator Howell, Nebraska, proposes to supplement the National Prohibition Act for the District of Columbia and provides, among other things, that any physician or pharmacist in the District of Columbia who shall be convicted of a second violation of any provision of the National Prohibition Act requiring him to do or to abstain from doing any act in his capacity as a physician or pharmacist shall forfeit his license to practice for one year.

H. R. 5653—A Bill introduced by Mrs. Norton of New Jersey, December 14, 1931, to authorize pay patients to be admitted to the contagious-disease ward of the Gallinger Municipal Hospital. "Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That hereafter pay patients may be admitted to the contagious-disease ward of the Gallinger Municipal Hospital for care and treatment at such rates and under such regulations as may be established by the Commissioners of the District of Columbia, in so far as such admissions will not interfere with admission of indigent patients."

S. 1769—Introduced by Senator Capper, Kansas, companion bill to H. R. 5653, was reported to the Senate January 11, 1932 with favorable recommendation.

MEDICAL ANNALS
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VOLUME I FEBRUARY, 1932 NUMBER 2

THE DETECTION OF TUBERCLE BACILLI IN THE CIRCULATING BLOOD*

LASZLO DETRE, M.D.
Budapest, Hungary

Our knowledge of the infectiosity of tuberculous blood antedated the discovery of tubercle bacilli. In 1868, Villemin, who discovered the infectious nature of tuberculosis, showed that by subcutaneous injection of the blood of tuberculous patients into guinea pigs one is able to reproduce the disease. It was only after the discovery of the tubercle bacilli that our knowledge became enlarged, mainly through the work of pathologists, who showed that miliary tuberculosis is the effect of a hematogenous spread of bacilli. Becoming interested in the details of this invasion, bacteriologists tried to detect the presence of tubercle bacilli by staining blood smears. Because of the small number of circulating bacilli their efforts were mostly futile.

In order to concentrate the bacilli Jousset (1903) dissolved the corpuscular elements of blood by means of pepsin and hydrochloric acid and stained the sediment. He described a great number of positive cases. Lesieur and Gary (1908), in order to prevent coagulation, collected blood by means of leeches, centrifugalized, then dissolved the sediment, centrifugalized again and examined the sediment. Other scientists utilized the anticoagulating property of sodium citrate. By these and similar methods the authors revealed the presence of bacilli in earlier stages of tuberculosis.

These findings cannot be accepted with entire certainty since the fact has been established that acid-fast bacilli are to be found in running water. A second cause of possible errors may be due to migrating cells carrying, during the period of digestion, acid-fast, non-pathogenic organisms from the intestines into the blood stream.

In order to avoid the unreliability of microscopic results interest was directed to another method, which promised greater accuracy. Guinea pigs were injected with a certain amount of blood (10 cc.) drawn freshly from the veins, and the result of this inoculation observed. When blood injected subcutaneously contains a considerable amount of bacilli, a primary ulceration appears within about a week, followed by the intumescence of the regional lymph nodes; the animal becomes feverish, then cachetic and succumbs within 8 to 10 weeks. Autopsy reveals generalized tuberculosis mainly in the spleen and liver. Tubercle bacilli injected peritoneally cause no local ulceration or bubo, and tuberculosis of the omentum is the prevailing finding at autopsy.

The main result of these investigations was the detection of virulent bacilli in about 2 per cent of mild cases, in 10 per cent of moderately advanced and in 30 per cent of advanced cases of pulmonary tuberculosis. On the basis of these results many older observations, such as the appearance of an osteomyelitic or a testicular tuberculosis after local traumatism, could be simply explained.

In 1908 Landouzy described a very peculiar form of tuberculous septicemia characterized by the lack of any macro- or microscopic tuberculous lesions. Probably they are due to the avian type of tubercle bacilli, especially since Löwenstein (1913) described as characteristic for avian tuberculosis of men a chronic sepsis with nonspecific foci in some organs (marrow of bones, kidneys, spleen). Since avian tubercle bacilli have been recognized as a relatively frequent agent of tuberculous infection both in men and animals, it is an interesting fact that guinea pigs present a marked resistance of this type of bacilli. Certain avian strains have been proved to be even as completely inoffensive to guinea pigs but are known to be extremely virulent in rabbits and fowl. The negative result of the guinea pig experiment, therefore, does not prove the absence of tubercle bacilli unless a control inoculation in fowl (e.g., in hens) has been made.

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* Read before the Society January 20, 1932.

Besides this argument against the use of guinea pigs there is another one regarding the minimal number of bacilli necessary to insure positive infections. If the number of injected bacilli is less than an unknown minimal quantity, the injected animals will not show the usual symptoms of experimental tuberculosis, except perhaps after a period of one to two years. For this reason the culture as a diagnostic method assures a greater certainty, since the appearance of only one colony affirms the diagnosis.

Because of the slow growth of the first generation of tubercle bacilli the exclusive use of media presenting optimal conditions is advocated. The Löwenstein culture medium contains: as the source of nitrogen, asparagine; as substances favoring growth, egg, potato flour and glycerine; as buffer, certain salts; and is stained with malachite green or congo red. This staining facilitates the recognition of the youngest colonies. On this medium the colonies are visible in about 2 to 3 weeks as tiny, dry spots, which develop 2 to 3 weeks later into scales or "warts." Sometimes a confluent growth occurs. The younger colonies are colorless or white; later some become grayish or yellowish.

In order to make this medium appropriate for the routine diagnostic work of sputa, pus, non-catheterized urine, etc., the elimination of all alien, contaminating organisms is essential. Formalin, antiformin, strong alkaline solutions are chemicals recommended for this purpose, since they kill alien bacteria but do not harm the tubercle bacilli which are protected by their wax-like cover. The use of a 15 per cent solution of sulphuric acid, recommended by Löwenstein and tried out by Sumiyoshi, Hohn and many others, because of the excellent results achieved, has become the accepted routine method, which assures the cultivation of tubercle bacilli from all kinds of excreta, secretions, feces and pathological tissues.

During the last few years a whole series of publications has appeared regarding the comparative value of the microscopic, inoculation and culture methods. Greatest recognition is due to Dimtza for the work he did on the subject in the laboratory of the Zürich surgical clinic in the comparative examination of 500 specimens of sputa, feces, urine, pus and exudates. He came to the conclusion that inoculation and culture lead approximately to the same results, whereas by means of the microscope the bacilli could be detected in only 75 per cent of the cases. This difference is explained by the fact that the tubercle bacillus appears not only in the usual rod-like form, but also as splinters (Spengler), non-acid-fast granules (Much), barely visible forms (Morton Kahn) and invisible, filterable forms.

The use of the sulphuric acid method and of the new culture medium enabled the searchers to approach the question of circulating tubercle bacilli. The difficulties of this kind of work formerly are illustrated by the fact that not more than twelve years ago (1919) Bingold did not succeed in cultivating tubercle bacilli from the blood in 326 cases of tuberculosis.

In 1929 Russew in Löwenstein's laboratory succeeded with a relatively simple method. He drew blood (8 to 10 cc.) from the veins into a tube containing 3 cc. of 5 per cent citrate of sodium, centrifugalized, removed and supernatant fluid, added 10 cc. of sterile distilled water to dissolve the red corpuscles, centrifugalized again, removed the supernatant fluid and distributed the sediment on the culture mediums. This method required rigidly aseptic work. When in doubt he treated the sediment with 15 per cent sulphuric acid for 10 minutes, centrifugalized for 5 minutes, washed with sterile saline for 5 minutes, centrifugalized again, finally distributed the sediment in culture tubes and sealed immediately afterwards with sealing wax. Colonies in positive cases were visible after 3 to 4 weeks, sometimes only after 2 months. He obtained his first series of 6 positive results in very grave pulmonary cases. The blood had been drawn in 4 of these cases 3 days, 6 days, 8 days and 2 months prior to their death; the 2 remaining cases represented extremely serious pulmonary tuberculosis. Immediately after his first successful series Russew changed the line of his work and tested the blood of surgical, afebrile cases for circulating tubercle bacilli.

The result of the research work depends greatly on the basic question. Two years ago this question seemed rather an absurd, or at least an heretical one, because the general rule of a certain parallelism between height of fever and number of circulating infectious organisms was accepted. This theory was supported by the following facts:

(a) The regularity of the appearance of malaria merozoites as well as of staphylo-streptococci in blood during the chill or during the rapid rise of fever.

(b) The negative blood cultures in afrebrile periods.

(c) The appearance of chills and high fever immediately after intravenous injection of contaminated liquids.

(d) The results of some experimental and clinical observations of my own. I injected rabbits with small quantities of anthrax bacilli of moderate virulence, took their temperature every 4 hours, and removed at the same time 0.1 cc. of blood from their auricular veins. This blood was immediately cultivated on agar plates. The curves of both fever and colony count showed a marked parallelism.

I observed a case of endocarditis lenta in which the streptococcus viridans could be regularly cultivated from the blood, but never in periods showing a temperature below 37.2°C. I had another case of coli pyelitis, in which the catheterization of the urethra provoked within a few seconds violent chills, the appearance of colon bacilli in the cirulating blood and very high fever (above 41°C.); I assumed that the mechanical lesions opened some of the superficial vessels of the infected area.

However, there are some reservations to this rule of parallelism. The results of blood cultures depend a great deal on the interference of antibodies, on the bactericidal powers of the organism, on the complexity of all biologic happenings resulting in the phenomenon of germ carriers and other factors. Whether the fever-producing chemical bodies are identical with secreted poisons of the circulating bacilli, or are merely toxic compounds liberated by lytic ferments out of the partly or totally dissolved bacteria are questions which do not interfere with the interpretation of fever as an indicator of the presence of invasive organisms in the circulating blood.

Up to 1929 the regular appearance of tubercle bacilli in the blood was known only in serious, febrile cases of pulmonary tuberculosis. Local tuberculosis was believed to be caused by casual invasion of the blood stream. The permanent presence of tubercle bacilli in the blood was considered a serious or ominous symptom. It was furthermore accepted that the consequences of an intrusion of tubercle bacilli depend entirely on the number of bacilli, their virulence and on the point of invasion. General invasion of the whole circulation denoted miliary tuberculosis, invasion of the pulmonary circulation denoted the development of disseminated pulmonary foci, invasion in the aorta indicated visceral tuberculosis, and invasion in the carotid artery meant meningeal tuberculosis.

The complete originality of Löwenstein's idea in tracing the bacilli in afebrile, non-cachetic cases of local tuberculosis is evident.

Russew started his work in making blood cultures of 8 surgical cases. His patients (5 spondylitis, 2 coxitis, 1 arthritis) were afebrile and in good physical condition. His 6 positive results proved that, outside of the premetastatic septicemia, the septicemia of very grave pulmonary cases, and the avian tuberculous sepsis, a fourth form exists, the benign bacillemia of surgical tuberculosis. In Löwenstein's laboratory the results achieved during 1930 and 1931 proved that this bacillemia is regularly present (70 to 80 per cent) in tuberculosis of the bones, joints, kidneys and eyes.

A second unexpected result of methodical blood cultures has been obtained by Prof. Reitter (Vienna) in cases of acute polyarthritis. For years he had referred to his results of microscopic and cultural examination of joint exudates, showing the tuberculous origin of subacute polyarthritis. He asserted emphatically that the almost mythical term of "rheumatic etiology" should be dropped. His opinion was identical with the theory heralded some 30 years ago by Poncet and his school and contrary to the general opinion, that this infection is due to metastasis issued from primary, infected foci (tonsils, teeth, ears, endocardium, etc.), or represents in other cases an infectious disease of its own.

Reitter published positive findings in the blood of 7 cases of typical acute polyarthritis; 4 of them were preceded by acute angina, and 2 were complicated by endocarditis. He succeeded in cultivating the bacilli not only during the febrile, but also in the subfebrile and afebrile period. With one exception there were no clinical or X-ray traces of respiratory tuberculosis. He mentions that none of his cases showed a positive Pirquet or Mantoux test, a fact of lesser importance than the absence of clinical or X-ray symptoms, because the negative allergy could have been produced by the generalization or spread of tubercle bacilli.

Since Reitter's first publication 37 additional positive findings have been published in both adults and children with acute polyarthritis, besides the positive results in subacute cases. The tuberculous origin of a large per cent of cases of acute polyarthritis seems well established, although it has not been definitely proved that the bacilli cultivated in Reitter's and other observers' experiments do not represent the real cause of polyarthritis, but are merely "mobilized" by the interference of the unknown real agent of this infection. From a theoretical standpoint this objection may be correct, but it is of no practical value since Reitter obtained positive cultures not only from the blood but also from arthritic exudates.

Very interesting results were recently published by Amersbach and co-workers from the Prague University Clinics. These scientists tried to detect by cultivation the presence of tubercle bacilli in 14 tonsils removed in cases of acute polyarthritis, and obtained 5 positive cultures. The histological examination of these tonsils showed none of the ordinary lesions of tuberculosis. By these results the rôle of the tonsils as primary foci of polyarthritic-tuberculous infection became evident, and the favorable therapeutic effect of tonsillectomy in relapsing arthritis was explained. Löwenstein mentions that most of these bacilli are of bovine type.

The well known clinical relations between chorea and polyarthritis were verified by Löwenstein's method in 4 positive cases of chorea. He obtained 17 additional positive results in 40 cases of multiple sclerosis. As no precise clinical data have so far been published, further conclusions cannot be drawn. At any rate it is remarkable that in 4 of 6 cases of retrobulbar neuritis, considered by many as a special symptom of multiple sclerosis, tubercle bacilli were present in the blood. In one of their 4 cases the tonsils had been removed and developed an abundant growth of the avian strain.

Professor Kren (Vienna) obtained very interesting results in cases of tuberculosis of the skin; 16 of 23 cases of erythema induratum, 1 of 4 cases of tuberculids, 2 of 4 cases of acne telangiectodes, 1 of 3 cases of granuloma annulare, 1 case of lupoid, 2 of 3 cases of scropuloderma, 5 of 10 cases of lupus vulgaris, 10 of 17 cases of lupus erythematosis were positive. In his last report (March, 1931) Löwenstein referred to 347 investigations from the dermatologic clinics of Vienna, Hamburg, Groningen, Copenhagen with 117 positive findings (33 per cent). The circulation of live tubercle bacilli in otherwise healthy, afebrile cases of skin tuberculosis is established. The authors stated that positive results are more frequent in Winter and early Spring. This difference is very probably due to the healing influence of the sun rays. Through these findings a whole series of new questions arose. First, the old question whether the so-called tuberculids and similar processes are due to the influence of supposed tuberculous toxins or of live bacilli has been definitely settled in favor of the latter.

The question as to the origin of these circulating bacilli is of wider importance. Are they swarming out from the infected tissues of the skin, or have they issued from some hidden focus to maintain by their circulation the specific inflammation in the already infected skin area? In this second case the eruptions could be considered as the only sensitive parts of an otherwise immunized or resistant organism. This question opens new fields for further research work.

The third question has reference to allergy. The benignity of the bacteremia is doubtlessly linked up with the stage of actual allergy, which is the basis of the so-called "infectional immunity" in tuberculosis. This view is supported by the following facts:

1. When the hypersensitiveness against tuberculosis is developed no superinfection of tuberculous guinea pigs can be provoked.

2. The highest stage of allergy, measured by the degree of inflammation of the Pirquet effect, occurs in the initial forms of pulmonary tuberculosis, in the cases of scrofulous glands, in bone and joint infections, in some skin infections, all characterized by a marked benignity. This benignity means, in other words, resistance against generalization.

3. There is a marked parallelism between the gradual decrease of the former allergy during an attack of measles and the development of a susceptibility to tuberculosis.

4. In the initial stage of miliary tuberculosis there occurs a sudden loss of allergy. In 1908 I published a case in which the disease started with chills, redness of the throat and with no other clinical symptoms than high fever. The diagnosis of miliary tuberculosis was made on the basis of sudden appearance of complete anergy.

The relations between allergy and benign bacillemia demand further studies. Only 40 cases have been published. Of 26 positive cases 22 (83 per cent), and of 14 negative cases only 3 (21 per cent) were highly allergic. Quantitative conditions may play an important rôle in all these questions. A small number of circulating bacilli increase allergic immunity, whereas large quantities diminish the resistance of the individual. Carefully planned biological analysis of the cultivated strains will surely yield further information concerning the correlation of this benign bacillemia with virulence, and also with the type of the infecting organism.

In view of the fact that already about 4,000 negative controls have been observed in blood samples of healthy persons as well as of patients with or without febrile diseases, the new technique is to be recommended to all students of diagnostic work as well as to all searchers interested in the pathogenesis of human tuberculosis.

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DISCUSSION

Dr. Robert A. Keilty: I would like to discuss this paper from two viewpoints: (1) it is a very interesting and very timely presentation; (2) it so happens that I worked in 1908 with Randall C. Rosenberger of Philadelphia, who first did the most important work in this country on the isolation of the tubercle bacilli by smear in the circulating blood. He published his reports in 1909. Shortly thereafter, McFarland, Beardsley and Holmes, in reporting the finding in distilled water of acid-fast bodies resembling the tubercle bacillus, started the discussion which followed concerning so-called distilled water and citrate acid-fasts. Rosenberger's work was carried out with both distilled water and citrate solution. To date this controversy has never been settled. If one follows the literature of 1908 to 1914 on the question of tubercle bacilli in the blood, he will find some reports positive and some negative. Rosenberger used 5 cc. of whole blood, citrated, centrifuged, smeared, laked and stained. He used hydrochloric acid as a decolorizer. It often took 4 or 5 days study on a single case of several slides before we found one or two bacilli. This is accounted for by the small numbers in the circulating blood. They were found in almost 95 per cent of consecutive cases if searched for long enough. The work was done in the Philadelphia Hospital and my own part was the technical preparation and the hunt for positive bacilli from other sources of the body, such as the urine, pleural cavities and sputum. We searched for but could find nothing that looked like tubercle bacilli in our distilled water at the Philadelphia Hospital. A year or so later Miss Brown, who had been working with McFarland, told me there were plenty of acid-fasts in all distilled water bottles. We took smears from one on the shelf which had been there for a number of years and it was loaded with an acid-fast organism tinctorially and morphologically like the tubercle bacillus. It so happened in Rosenberger's original work that the still was broken and we procured a new one. We did not use very much water at a time but it was freshly made and placed into a fresh flask. After Miss Brown demonstrated these organisms from the scum of old bottles I went to a number of the other rooms and found that there were acid-fasts in every old bottle. I went to the large storage vats and also found plenty there. Several years later, about 1919, I took up the subject again and started out with a fresh, clean, gallon bottle in which there were no acid-fasts, poured freshly distilled water in which there were none demonstrable into the bottle every day but never cleaned it out. A little scum began to develop on the bottom of the bottle and after about 6 or 8 months the acid-fasts began to appear. Cultures of these never grew acid-fast strains, and inoculations into guinea pigs never produced tuberculosis. In conclusion, I am quite sure that tuberculosis is a bacteremia. This is not only true just before the cases die and in acute dissemmations but intermittently in small numbers at all times. It is not a bacteremia in the sense of typhoid fever; the organisms are very difficult to find and extremely difficult to culture. Failures in guinea pig implantations of whole blood are due to several factors. There are several practical points in this discussion but time will not allow me to go into this phase. I want to affirm Doctor Detre's report that tuberculosis is a bacteremia and that the tubercle bacillus occurs in the circulating blood. I am quite sure the more recent work in Europe will help in eventually solving the problem. We are all grateful to Doctor Detre for bringing the subject to our attention so forcibly.

CLINICO-PATHOLOGIC TYPES OF HEMOCHROMATOSIS*

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Von Recklinghausen in 1889 gave the name hemochromatosis to a deposition of hemosiderin and hemofuscin in most of the organs of the body, associated with cirrhosis of the liver and pancreas. French authors had given the name bronze diabetes to a disease characterized by pigmentation of organs with bronzing of the skin, cirrhosis of the liver and diabetes mellitus. This syndrome is now generally called hemochromatosis. It happened that in 1875 a case of this rare disease was studied in Washington and reported in the Proceedings of the Medical Society of the District of Columbia of that year. The diagnosis most strongly supported clinically was alcoholic cirrhosis of the liver with terminal heart failure. When the organs were examined macroscopically and microscopically the liver was found to be cirrhotic, but an interpretation of the yellowish-brown color of the liver and the brown color of the pancreas was not made until two years ago. At that time Major G. R. Callender suspected the nature of the disease by the gross appearance of the liver, which had been preserved in the Army Medical Museum, and studied the organ more carefully. This case is reported again, therefore, in the new light thrown upon it by this more recent study and will be used to illustrate one type of this disease.

Although hemochromatosis is rare, as indicated by the fact that probably less than 150 cases have been reported in the literature, much study has been made to elucidate the nature of the disease. The pathologic features have been well described, but very little is known about the etiology or about the sequence of events in the development of the changes. The two pigments are found more or less generally distributed throughout the body, but the great mass of the pigment is found in the liver, pancreas and abdominal lymph nodes. Most of the pigment is hemosiderin, but there is a smaller amount of hemofuscin also. This is generally not supposed to contain iron, but like hemosiderin is derived from hemoglobin. Mallory believes, however, that hemofuscin does contain iron in masked form and that it is the progenitor of hemosiderin. The actively functioning cells of the parenchymatous organs contain most of these pigments. It is, however, the pigment deposited in the connective tissue, especially of the liver and pancreas, which produces the sclerosis, although parenchymatous cells completely destroyed by the pigment take part in the process.

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* Read before the Society, January 27, 1932.

Blanton and Healy in 1921 reviewed the pathologic findings in 75 of the 81 cases reported up to that time. The liver was enlarged in 95 per cent of the cases and cirrhosis was present in 96 per cent. The mass of the pigment in this organ was in the connective tissue, but small granules were present in the liver cells, Kupffer cells, endothelium of blood vessels and epithelium of the bile ducts. Ascites was found 18 times. Marked fibrosis was present in the pancreas in many cases. Glycosuria was recorded in 85 per cent of 58 cases. The spleen was often moderately enlarged and firm, but contained relatively little pigment. The abdominal lymph nodes draining the liver and pancreas were often enlarged, brown, firm and fibrotic, and contained a large amount of pigment. Iron pigment was found in the skin in about half of the cases, but it was usually scant and present only in the sweat glands. (It may be present, however, in the basal layers of the epidermis, and as clumps in the corium.) Much pigment was not found in the kidneys; it was practically always only in the epithelial cells of the tubules. When examined, the bone marrow was found to be hyperplastic and to contain some hemosiderin. Most other organs contained variable amounts of pigment, usually only in the parenchymatous cells.

The disease occurs only in adult life, from 30 to 85 years of age. Only a few instances of the disease in women have been reported (Abbott, Hodges, E. S. Mills, and Moeller and Hutton.)* The duration is usually estimated at about 10 to 15 years. In a series of cases studied by E. S. Mills symptoms of cirrhosis were present in 10 cases, pigmentation of the skin in 3, and diabetes in only one. Usually there was weakness and loss of weight. Ascites was present in 8 and jaundice in 5. The liver was not often very much enlarged, but was usually finely nodular. When the liver was large gastrointestinal disturbances, abdominal varicosities, ascites and jaundice did not occur often. When it was small these symptoms were common. The size of the liver did not seem to bear any relation to the size of the spleen. The pigmentation of the skin is usually a dull gray-brown or dirty-brown and is often more pronounced on exposed parts. Parts normally pigmented usually become darker. The frequency of diabetes mellitus in the series reported by Mills was very low compared to the incidence given by Sprunt and other reviewers. Often the diabetes is of severe degree.

Various theories have been propounded to explain the nature of hemochromatosis. The most probable explanation is that the pigment formation and the sclerosis are both due to some intoxication. Some authors have ascribed the hemosiderosis to an excessive destruction of blood. Patients with hemochromatosis do not, however, have much anemia, and the distribution of the pigment is different from that of diseases in which there is excessive hemolysis of blood. In the latter the pigment is deposited mainly in the spleen, bone marrow and sometimes in certain lymph nodes. In pernicious anemia, a disease in which there is considerable deposition of hemosiderin, most of the pigment is found in the liver and kidneys, and relatively little in many of the other organs which are affected in hemochromatosis. As in the latter disease there is also relatively little iron deposited in the spleen and bone marrow. Cirrhosis of the liver and diabetes are not common in pernicious anemia. In hereditary hemolytic icterus and in sickle cell anemia, in both of which there is active destruction of blood, cirrhosis of the liver rarely occurs. In the latter there is much hemosiderin in the liver and spleen, but there is hyperplasia of the liver rather than cirrhosis and extreme atrophy of the spleen rather than enlargement. In splenic anemia cirrhosis of the liver is constant in the later stages, but the liver contains very little of the iron pigment. On the other hand, the occurrence of considerable amounts of hemosiderin in the liver in cases of ordinary Laennec's cirrhosis is not uncommon. It seems unlikely, therefore, that excessive hemolysis is the cause of the hemochromatosis. The hemosiderosis is also probably not due entirely to failure of the liver to properly dispose of the iron of normally destroyed erythrocytes, since it is not common in many cases of primary liver disease.

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* A further case will be reported elsewhere by W. M. Yater and S. Dessoff.

Rous and Oliver produced a pigmentation in rabbits strikingly similar to that in patients with hemochromatosis by protracted hemolysis of foreign corpuscles from repeated transfusions, but hepatic cirrhosis was not produced. They conclude that a hepatic cirrhosis of unknown origin occurs in hemochromatosis which leads to a failure of the organ to deal adequately with the iron-containing products of normal blood destruction, and that the latter accumulates in the organism.

More recently Mallory has postulated that hemochromatosis may be the result of a binding of a derivative of the hemoglobin liberated in normal hemolysis by copper derived from food, alcoholic beverages or copper dust swallowed or inhaled. Since one-twelth to one-twentieth of the total number of red blood cells is destroyed normally each day, failure to excrete the normal amount of iron would result in an accumulation of these products of erythrocytic catabolism. Mallory pointed out the relatively large amounts of copper in many common articles of human consumption, and by feeding rabbits small amounts of copper acetate for long periods of time he produced a pigmentary hepatic cirrhosis. Mallory and Parker have been able by staining methods to demonstrate copper in association with hemofuscin and hemosiderin in regenerating liver cells in patients with hemochromatosis. Mallory's experiments in animals were corroborated by Hall and Butt. Later, however, Flinn and VonGlahn reproduced a similar condition in rabbits' livers by feeding substances free of copper, such as carrots and sodium acetate. Hall and MacKay have recently corroborated the occurrence of cirrhosis of the liver in rabbits fed copper acetate. They have also shown that the incidence and severity of pigment cirrhosis in rabbits fed largely carrots was not as great as as indicated by the work of Flinn and Von-Glahn. Much chemical work has been done in late years in cases of hemochromatosis. In 1928 Schönheimer and Oshima found three to four times the normal amount of copper in the liver in 17 cases. Herkel found as much as ten times the normal amount in 24 cases. He demonstrated, however, that in 8 of 10 cases of non-pigmented cirrhosis there was also a great increase in content of copper. Funk and St. Clair found a great amount of copper in the liver of their case. In the case of Higgins and Pitts zinc was implicated as a possible cause of the disease.

Another possible explanation of hemochromatosis is that some poison has destroyed the ability of the tissues in general to carry on the normal metabolic processes concerned with iron, which is an important catalyst in internal cellular respiration, and that both this poison and the actual accumulation of the iron pigment are factors in the production of the cirrhosis of the liver and pancreas. The diabetes is usually assumed to be the result of the cirrhosis of the pancreas, although microscopic evidence of serious involvement of the islands of Langerhans is not always present.

Several cases of hemochromatosis have been studied by us, and from this series and a survey of the literature on the subject we have divided the cases into five main types: (1) typical bronze diabetes, with pigmentation of the skin, cirrhosis of the liver and diabetes mellitus; (2) pigmentation of the skin and cirrhosis of the liver without diabetes; (3) absence of pigmentation of the skin, diabetes and cirrhosis dominating the picture; (4) hemochromatosis without pigmentation of the skin or diabetes; (5) primary carcinoma of the liver secondary to pigment cirrhosis. We shall illustrate each of these types by a case.

Case 1. Bronzed skin, advanced cirrhosis of the liver, mild diabetes mellitus.

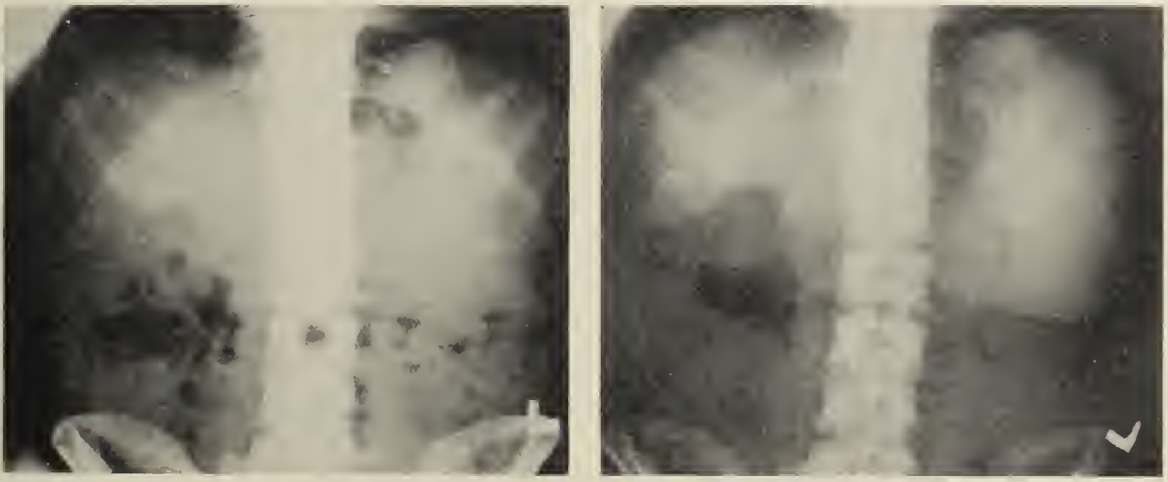
A B

Fig. 1. Case 1

A. Roentgenogram of abdomen before injection of thorotrast

B. Roentgenogram of abdomen after injection of thorotrast, showing small, cirrhotic liver and enlarged spleen

The patient, a Jewish salesman, aged 43 years, began to have indigestion and crampy pains in the lower abdomen 10 years ago. At first these symptoms were relieved by medication for long periods of time. In the past few months, however, the dyspepsia and pains have been getting worse. The former is described as a feeling of tightness in the abdomen after meals with belching and occasionally regurgitation. The symptoms are relieved when he takes soda and belches several times. Fresh vegetables and fruits and fried or greasy foods aggravate these symptoms and have been avoided. The crampy pains occur about 2 hours after eating, are present mainly in the left lower abdomen, and may be associated with a burning sensation in the epigastrium. Meat always makes them worse. During the past 6 or 7 years the skin has been gradually getting darker and the urine has been brownish. In the past 2 or 3 years urination has been more frequent and has occurred 4 or 5 times each night. A year and 9 months ago sugar was found in the urine and has been present from time to time since. The appetite has been good and there has been an increase of 18 pounds in weight in the past 6 years. Asthenia is not complained of. The patient has had measles, influenza and pneumonia. Physical examination reveals a man of average build with a moderately prominent abdomen. The skin is a dark bluish or slate-colored brown, and the areolae of the nipples and the genitalia are much darker than normal. There is no pigmentation in the buccal mucous membranes. The teeth show moderate caries. The liver is not palpable and seems to be smaller than normal. The spleen, however, moves downward on inspiration to about 3 inches below the left costal margin. There may be a small amount of fluid in the abdomen. The blood pressure is 135 systolic and 85 diastolic. Otherwise the examination is negative. Urinalysis shows a reddish amber color, specific gravity of 1.025, acid reaction, a trace of albumen, a small amount of sugar and microscopic findings of no consequence. The hemoglobin is 75 per cent (Dare), erythrocytes number 3,770,000 and the leucocytes 7,200 per cubic millimeter of blood, with 79 per cent polymorphonuclear neutrophiles, 70 per cent segmented forms and 9 per cent band forms. The blood platelets number 163,000 per cubic millimeter of blood. The van den Bergh test gives an indirect reaction with serum bilirubin of 4.3 mg. per cent. Test of fragility of erythrocytes shows beginning hemolysis at 0.42 per cent and complete hemolysis at 0.34 per cent saline solution. Blood Wassermann and Kahn tests are negative. The blood sugar is 95 mg. and the blood cholesterol is 178 mg. per 100 cc. of blood. The feces are brown and are negative for occult blood. A glucose tolerance test with 100 grams of glucose given orally gives the following:

	mg.
Blood sugar after 12 hours of fasting........	107
Blood sugar ½ hour after glucose..............	176
Blood sugar 2 hours after glucose.............	167
Blood sugar 3 hours after glucose.............	42

Urine specimens are negative except for the two hour specimen, which practically completely reduces the Benedict's solution. These results indicate a mild but definite diabetes mellitus. A bromsulphthalein (Rosenthal) test of liver function shows 85 per cent of the dye in the blood after 5 minutes, 35 per cent after 30 minutes and 15 per cent at the end of 60 minutes, indicating severe liver damage. Fluoroscopic study of the gastrointestinal tract shows a normal stomach displaced to the right by the enlarged spleen, and a peculiar, irregular distribution of the barium throughout the small intestines, as is sometimes seen in tuberculous peritonitis. Roentgenograms after intravenous injection of thorotrast show the enlargement of the spleen and marked cirrhosis of the rather small liver (Fig. 1). A biopsy of the skin of the abdomen shows the presence of small granules of iron-containing pigment in the basal layers of the epidermis and some clumps of pigment in the corium. The Rous test for hemosiderin granules in the urine is positive.

Comment. The diagnosis in this case was not difficult. Addison's disease was easily eliminated by the lack of asthenia, the mild hypertension and the absence of pigmentation of the buccal mucous membranes. The latter is almost always present in Addison's disease, but has been reported in very few cases of hemochromatosis (Sprunt). Jaundice as the cause of the color of the skin was eliminated by the lack of yellow in the sclerae and mucous membranes and by the quantitative estimation of the serum bilirubin, which was not sufficiently increased to account for the bronzing. By this same reasoning, together with the finding of normal fragility of the erythrocytes, hereditary hemolytic icterus with its splenomegaly was ruled out. The discovery of hemosiderin in the skin and in the urine definitely affirmed the diagnosis of hemochromatosis. The bromsulphthalein test of liver function and the glucose tolerance test gave incontestable evidence of the presence of seriously impaired hepatic function and of mild diabetes mellitus. The thorotrast x-ray study of the liver and spleen, which we consider of great value in differential diagnosis of diseases of the liver, showed positively a severe cirrhosis of that organ. The moderate increase in serum bilirubin is explicable on the basis of the cirrhosis. Snell found slightly elevated values in 25 per cent of his large series of cases of ordinary portal cirrhosis and a deeper jaundice in a few cases. This case is an excellent example of typical hemochromatosis in the moderately advanced stage. It is easy to see how the diagnosis was missed during the first few years when there was only slight pigmentation of the skin and nothing more than dyspepsia. The train of events well illustrates the usual sequence of the main features of the disease—first pigmentation, then evidence of cirrhosis of the liver, and finally diabetes. Had the patient died some years before of some intercurrent disease, such as pulmonary tuberculosis and tuberculous peritonitis, which are not uncommon complications of this disease, the diagnosis could probably have been made only at necropsy and diabetes would not have been present. The chances are that the diabetes will grow progressively more severe.

Case 2. Pigmentation of the skin and cirrhosis of the liver without diabetes mellitus.

A teamster, aged 43 years, had had attacks of severe pain in the epigastrium for 5 years, becoming more frequent. He thought that certain foods produced these attacks, especially hog meat and other greasy foods. In the last year these pains shifted to the right upper quadrant, were more severe and lasted longer. Catharsis gave some relief. The appetite began to fail and heartburn developed. For a year the liver was known to be large, being palpable a hand's breadth below the right costal margin; it was irregular in outline, firm and tender. Weakness gradually came on but without much loss of weight. The skin had been described as being cyanotic for a year, but later it was definitely a dark tan, most marked over the exposed parts of the body and the genitalia. In addition there was a patch of darker pigment in the right lumbar region larger than the palm of the hand and a few scattered liver spots over the lower chest. There was no evidence of ascites. Urinalyses had always been negative and the blood sugar was normal. The hemoglobin was 80 per cent, the red blood cells numbered 4,000,000 and the white blood cells 8,000 per cubic millimeter of blood. X-ray studies of the gastrointestinal tract, pyelograms of the kidneys, gastric analysis and blood Wassermann were negative. An exploratory operation was performed, at which the liver was found to be cirrhotic and of nutmeg appearance. The patient died and necropsy could not be performed, but a biposy of the skin and of the liver showed hemosiderin. The latter organ contained a large amount of the pigment.

Comment. This case shows that the term hemochromatosis is preferable to bronze diabetes. In hemochromatosis diabetes mellitus frequently develops, but usually rather late. When it exists the diagnosis should be "hemochromatosis with diabetes mellitus." A glucose tolerance test may reveal, however, a latent diabetes.

Case 3. Absence of pigmentation of the skin; moderately severe diabetes mellitus controlled by diet and insulin.

The patient was an Army officer, 55 years of age. In the last two years he had had several illnesses, viz., acute sinusitis, acute nephritis and acute appendicitis. He had used alcohol moderately. Nine months before, diabetes mellitus had been discovered. After this he lost weight and strength. For two months before death he was very ill. His diabetes was well controlled by means of a weighed diabetic diet with 30 units of insulin daily. The blood pressure was very low, about 80 systolic and 55 diastolic. The skin was pale and not pigmented. The urine contained a small amount of albumen and many hyaline casts, but no sugar; the specific gravity ranged from 1.017 to 1.030. The phenolsulphonephthalein test of renal function gave a return of 85 per cent in 2 hours. There was moderate secondary anemia. The blood sugar ranged from 88 to 211 mg. per 100 cc. of blood. The blood non-protein nitrogen and the creatinin were not above normal. Anasarca with right hydrothorax and ascites with pulmonary congestion developed, the patient went into non-diabetic coma and died after 2 days. Necropsy disclosed a liver weighing 2150 grams (normal 1500), pale yellow, mottled and very firm. The spleen weighed 340 grams (normal 150). The pancreas was enlarged, firm and brown. Histologic examination of the liver showed advanced portal cirrhosis and a heavy deposit of hemosiderin. The pancreas was fibrotic and deeply pigmented also. Other organs examined all contained some pigment; of these the adrenals contained considerable.

Comment. The case was typical of the so-called bronze diabetes except that there was not pigmentation of the skin. In such a case the diagnosis would be almost impossible. The anasarca was probably due to the portal cirrhosis. The arterial hypotension may have been due to the deposit of pigment in the adrenal glands. The diabetes was controlled without difficulty. In most cases insulin has been effective, although in some instances difficult because of the severity of the diabetes. In a few cases there has been an insulin resistance, which was usually not permanent. Allan and Constam have reported such a case and have reviewed the subject. Before the use of insulin patients with hemochromatosis and severe diabetes often died of diabetic coma within a few months or a year after the onset of glycosuria. Now with proper treatment they live much longer and usually do not die of diabetes.

Case 4. Absence of pigmentation and clinical diabetes, death due apparently to hepatic cirrhosis and heart failure.

The patient, an Irish tailor, aged 43 years, had been a moderate drinker for most of 25 years. For 4 or 5 years he had had a capricious appetite and more or less indigestion. Two years before he had had an attack of pain in the region of the liver with distension of the abdomen. Diarrhea and indigestion had been present constantly for 6 weeks. Because of these symptoms a physician was consulted. The patient was found to appear anemic with a slightly icteroid tint, and the conjunctivae were slightly yellowish. The abdomen was greatly distended and tympanitic. The liver was greatly enlarged and smooth, but somewhat tender in the region of the gall bladder. Physical signs of fluid in the right side of the chest were present. There was some edema of the legs. The spleen was palpable. The stools were black, watery and scanty. The temperature was normal; the pulse was 160, small and weak. The urine was "muddy," acid, of 1.023 specific gravity, without albumin, casts or bile. Despite the best medical attention of the times (1875) the patient became rapidly worse and died after eleven days, the main symptoms having been exhaustion, vomiting, dyspnea, feeble pulse and edema of the legs. Necropsy revealed right hydrothorax with 6 pints of yellowish fluid, a large dilated heart (540 gm.), a large firm liver (2700 gm.) with a roughened reddish brown surface and a yellowish-brown cut section, and a large brown pancreas (150 gm.). The liver on microscopic examination was found to be quite cirrhotic. Two years ago Major Callender examined it more thoroughly and found it literally loaded with hemosiderin. This fact coupled with the gross description of the pancreas definitely showed this to be a case of hemochromatosis.

Comment. The terminal picture of this patient seems to be a mixture of symptoms which might have been due to the hepatic cirrhosis and to congestive heart failure. The criticism may rightly be made that this may not be a case of hemochromatosis. This would bring up the question of what is meant by the term. We submit that the term is applicable to any widespread accumulation of hemosiderin and hemofuscin associated with cirrhosis of the liver. Probably the cases of Laennec's cirrhosis in which there is heavy deposition of the pigments in the liver are of the same nature as cases called bronze diabetes. At least, until more is learned of the nature of both hemochromatosis and of cirrhosis of the liver there is probably no justification to separate these cases, although cirrhosis associated with hemosiderosis of the liver alone may be a local disturbance only.

It is to be observed that in all four of the types already described cirrhosis of the liver is present, as it is also in the fifth type, and that the variables are pigmentation of the skin and diabetes. It is probable that in the early stage of all types there is pigment accumulation without cirrhosis. We have one necropsy case in this stage in a man 24 years old.

Case 5.* **Primary carcinoma of the liver on the basis of hemochromatosis and cirrhosis.**

The patient, a police captain aged 59 years, had complained for about 2 months of lack of appetite and of nausea, belching and dull epigastric pain about 1 hour after eating. The pain occurred about every other day. In the last 3 weeks about 15 pounds of weight had been lost. Urination occurred once or twice each night. The patient appeared somewhat weak and slightly sallow. There was an indefinite mass in the right upper quadrant of the abdomen which was undoubtedly an enlarged liver. The blood pressure was 150 systolic and 100 diastolic. There was slight anemia. The urine was essentially normal. Occult blood was present in the feces, but x-ray study of the gastrointestinal tract was normal. The blood sugar was 100 mg. per 100 cc. of blood. The van den Bergh reaction was normal. An exploratory operation was performed, at which a large, firm, smooth liver was found with yellowish mottling on a very dark brown background. Primary carcinoma of the liver was diagnosed. The patient died a month after operation, becoming progressively more emaciated and weaker and developing massive ascites with moderate jaundice. Necropsy revealed the liver to be immense, weighing 4,365 grams. It was firm and smooth, but some raised areas were present and nodules could be felt throughout, especially in the right lobe. The cut section was reddish-brown with irregularly sized and shaped brownish-yellow areas of firmer consistency and a few red areas of softer consistency; these were larger in the right lobe. Fibrous bands penetrated the organ from the markedly thickened capsule, and fibrosis was present throughout. There was a large mass of reddish lymph nodes at the porta hepatis apparently obstructing the common bile duct and surrounding the portal vein. Similar lymph nodes were present in the parasternal and the subdiaphragmatic chains. The spleen was not enlarged. The pancreas was brown. There were old adhesions in both pleural cavities and between the diaphragm and liver, with calcification of the pleura over the left diaphragm. The pericardium and stomach contained blood. Microscopic sections showed a cirrhotic liver replaced almost completely by malignant liver cells, and a massive deposition of hemosiderin throughout. The lymph nodes mentioned were carcinomatous and contained a great deal of iron pigment.

Comment. Primary carcinoma of the liver complicating hemochromatosis is of relatively frequent occurrence. Another instance of this condition has been studied by us and will be reported elsewhere. E. S. Mills had three in his series of seventeen cases of hemochromatosis, and Blanton and Healy reported one in their series of four cases. The regenerative power of the liver is apparently so great that occasionally with excessive irritation, as by the hemosiderin, the cells become malignant. When in a case of hemochromatosis the liver is unusually large and perhaps uneven or nodular a complicating malignancy should be thought of. The short clinical course of this case indicates that the carcinomatous process developed rather early before pigmentation of the skin or diabetes could develop. Death was due perhaps more to the malignancy than to the cirrhosis. Carcinoma may develop, of course, in association with any of the four previous types of hemochromatosis.

Of the five cases reported, which constitute half of our series, there was a history of alcoholism in only two, and it was only moderate in these. In none of the cases was there any evidence of exposure to copper or other metal in any unusual way.

SUMMARY

Five main types of hemochromatosis on a clinico-pathologic basis have been illustrated by five cases. The designation bronze diabetes is applicable to only one or at most two of these types. Owing to lack of knowledge of the pathological physiology involved in hemochromatosis this classification may include several different conditions, but at present there is no reason to think that they are not of the same nature. These five types are as follows: (1) typical bronze diabetes, with pigmentation of the skin and cirrhosis of the liver and diabetes mellitus; (2) pigmentation of the skin and cirrhosis of the liver without diabetes; (3) absence of pigmentation, diabetes and cirrhosis dominating the picture; (4) hemochromatosis without pigmentation of the skin or diabetes; (5) primary carcinoma of the liver secondary to pigment cirrhosis. Attention is drawn to biopsy of the skin and to examination of the urine by the Rous method as aids in diagnosis. If these tests are negative, however, the diagnosis is not definitely eliminated. The thorotrast x-ray study of the liver is given as a method of helping to determine the presence and severity of the hepatic cirrhosis in conjunction with the bromsulphthalein test of liver function. In cases in which glycosuria has not been observed and in which the blood sugar is normal a glucose tolerance test may reveal latent diabetes mellitus and thereby strengthen a tentative diagnosis of hemochromatosis.

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* To be published elsewhere in greater detail by E. R. Whitmore and W. M. Yater.

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THE PRESENT STATUS OF RHEUMATIC FEVER AND RHEUMATIC HEART DISEASE*

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Rheumatic fever in its several manifestations constitutes today one of the greatest challenges in modern medicine. Its serious proportions may be grasped at once when consideration is given to the fact that cardiac disease is easily the leading cause of death today and that in the cold temperature zones, the rheumatic type constitutes almost forty per cent of all heart disease. Added to this is the very unfortunate fact that characteristically, rheumatic heart disease attacks, cripples, and kills the youth of the population making its greatest inroads upon individuals under thirty years of age. The most striking acute manifestations of rheumatic fever, namely, the joint involvement and the chorea, have been recognized for generations, and the tendency to cardiac involvement in these cases has been universally appreciated for years. Until rather recently the arthritic picture and the chorea were regarded as the primary conditions and the cardiac signs as a complication or sequela of them.

Today, however, the clinical conception of rheumatic fever is quite different. We now recognize that the disease may be manifested in any one of several manners. Basically, a polyarthritis, a carditis, chronic tonsillitis, pleuritis, chorea, subcutaneous nodules, and growing pains are all manifestations of it. Any one, two or more of these may be present in a given case of rheumatic fever. Further, it may be said that the most frequently encountered of these manifestations is the carditis, and its appearance clinches the diagnosis of rheumatic fever which previously in a given instance may have been a little uncertain.

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The disease involves the heart in the form of an endo-, myo-, or pericarditis, and from the pathological standpoint all three are present much more frequently than any one alone. From the clinical standpoint the endocardial evidences are more easily recognized and more frequently found. In an analysis of 933 cases of rheumatic heart disease White found mitral involvement alone in 62 per cent, aortic alone in 5 per cent and combined mitral and aortic in 33 per cent. In this series definite evidences of myocardial involvement could be determined in 5 per cent and of pericarditis in 7 per cent. Of all cardiac lesions, that which points most certainly to rheumatic origin is mitral stenosis.

In the present decade more than ever, a vast amount of investigation has been directed toward rheumatic fever. The bizarre and complicated nature of the disease has made the entire problem most difficult. In approaching the question, endeavors are being guided mainly along two paths, that of etiology and that of epidemiology. Considering the former, it must be said at once that the specific cause is as yet unknown. Although the fact that the disease is of infective origin has not even been definitely established, the great majority of investigators feel, nevertheless, that it is of an infectious nature and that some types of streptococci are most probably the offenders. Numerous investigators from time to time have isolated streptococci of an individual type and each in turn has believed that his was the real causative organism. The last single organism to attract much attention was that described by Small in 1927 and termed by him as the Streptococcus cardioarthritidis. But as yet no single organism has received enough confirmation to establish it as the cause of the disease. Although not achieving their definite goal, the work of these men has probably not been in vain, for it has served to foster the impression that several different strains of the nonhemolytic streptococci may be factors in the etiology. Further impetus has been given this view by Cecil and his co-workers. By specialized technique they are able to isolate streptococci from the blood and joints in a higher proportion of rheumatic cases than other investigators, and they find that there are not one but several different types of nonhemolytic streptococci.

Another etiological hypothesis of more than passing interest is that set forth by Swift of the Rockefeller Institute in 1928. His theory explains many of the unusual features of the disease and has the support of many other investigators. He believes that various strains of streptococci are present in these cases but that many of the clinical manifestations of the disease do not come directly from the organisms, but are an allergic reaction of the patient to the several types of streptococci. This theory is quite intriguing and merits consideration. In support of it, it may be cited that in serum sickness, which is purely allergic in origin, the joints at times become swollen and tender in some such manner as rheumatic joints. Again it would help to explain why the joint involvement in rheumatic fever moves from joint to joint, involving a given joint for only a short time. Still further it would explain why no degree of joint destruction or permanent damage ever follows rheumatic fever, which is the opposite of what is found in other arthritides of infectious nature. Finally, it would help to explain the presence of different strains of streptococci. In other words, it assumes that the individual sensitivity of the patient to one or several strains of streptococci is a vital link in the chain.

In reference to the epidemiology of rheumatic fever many important observations have been made by a great number of men. One of the most recent articles upon the subject is that of Paul of New Haven who made a survey of the question at the request of the American Heart Association on a grant from the Metropolitan Life Insurance Company. It has long been known that rheumatic fever appears with greatest frequency in the north temperature climates of Europe and America. Thus, the incidence is highest in the Scandanavian countries, in the British Isles, in Canada, New England and the most northern states across this country. The incidence gradually decreases south of these points becoming very much less in the southern part of the temperate zone and almost entirely disappearing in the tropics. Cold weather thus appears to be a determining factor in the incidence of rheumatic fever. It may further be mentioned in this connection that the greatest number of cases occur in the fall months in England and in the spring months in this country, the colder and wetter months in each location corresponding to the greatest incidence.

The familial incidence of rheumatic fever has likewise received much attention, and it has been stated that one-fourth to one-half of the cases of rheumatic fever give a history of one or more other case in the immediate family. Females are affected with greater frequency than males. Further, many investigators have found the incidence to be higher in the poorer classes of the city. Thus, dispensary groups show a higher incidence than is seen in private practice, and again public school children display it more frequently than those in private schools.

The relationship of rheumatic fever to acute tonsillitis is interesting. It is common observation that very frequently acute attacks of rheumatic fever are ushered in by an attack of acute tonsillitis, and the corollary is also frequently observed that cases of the chronic form of rheumatic fever are particularly prone to develop sore throat. However, there is far from unanimity of opinion concerning the relationship that the removal of tonsils bears to the development of rheumatic fever. Most of the statistics on the subject are based upon groups of cases too small for general conclusions. The best work in this respect is that of Kaiser who has followed the subsequent histories of twenty-two hundred tonsillectomized children together with an equal number of controls over the periods of three and ten years. In respect to rheumatic fever he concludes that the primary incidence of this disease is one-third less in children whose tonsils have been removed, but that the operation has no effect in preventing recurrent attacks of rheumatic fever in those children whose initial attack occurred before the removal of the tonsils.

In many instances it has been noted that waves of rheumatic fever tend to occur in armies, institutions and in households. This observation has frequently been made in convalescent homes for rheumatic children. In this connection it may be said that evidence is not uncommonly found which points to a common source and type of infection with different manifestations in different individuals. It seems, in other words, that the infection travels from one individual to another but appears in a different form.

In the past few months it has been my privilege to observe two such instances. In the first instance an individual in the home developed a severe infection about the nose which was very suggestive of erysipelas. A few days later a second individual in the home developed an acute tonsillitis with an acute sinusitis and otitis media of a streptococcic nature. A third individual at the same time developed an acute tonsillitis which terminated in bronchopneumonia. A fourth almost immediately developed a tonsillitis followed by an acute rheumatic fever. In the second instance, one in the home developed erysipelas. While she was sick another developed acute streptococcic tonsillitis, and while they both were sick a third individual developed a streptococcic sore throat immediately followed by severe acute rheumatic fever.

In reference to the question of therapy it can be appreciated from what has already been said that the treatment of rheumatic fever and rheumatic heart disease has undergone some change over the past few years. With the question of specific etiology unsettled as it now is, there is, of course, no widespread use of specific vaccines or sera. Some methods of this type are being used in isolated clinics in connection with the studies of streptococci and their relationship to the disease. However, none of any proven value is at hand for routine clinical use. The most important addition to the treatment has come about as the result of a clearer conception of the clinical manifestations of the disease. In days past the treatment was largely adapted to symptoms of the patient. Thus, during the very painful arthritic manifestations or the very evident choreic behavior, the patient received concentrated attention from his medical advisors, but once these had subsided he was allowed to go his way. This meant, of course, that the more serious cardiac signs were permitted to go unattended until perhaps months or years later when the failing heart forced itself into the center of the picture. Today this attitude should mean absolute rest in bed and close observation. This entails more perhaps than is evident on the surface. It means that a patient with the arthritic symptoms must be kept at rest not only until the joints are absolutely clear but until all evidences of fever have passed for several weeks. The temperature must be taken and recorded with the same care with which it is done in tuberculosis, for even a fraction of a degree may mean activity. If any murmurs appear in the heart or other evidences of heart involvement are found, still greater length of rest is indicated. From the cardiac angle the crux of the situation in rheumatic cases is always whether or not there is activity of the infection in the heart. Any time prior to the terminal stages of this type of heart disease the damage already done in the heart is not to be feared as much as the potential damage which will be brought about if there be continued activity. Again, subcutaneous nodules are extremely important not only from the standpoint of diagnosis but even more as an aid in guiding therapy. Regardless of the stage of the illness, whether other evidences of activity are present or not, the subcutaneous nodules mean but one thing, that is, that the rheumatic infection in the individual is still active. Thus again, in their presence rest must be insisted upon until some weeks after their final disappearance. Still further, a sore throat, slight pains in the joints, or pleurisy in a patient who has been known to have had active rheumatic fever demand much respect for they may be evidences of renewed activity of the infection. In many of the large cities of this country and in England there exist convalescent homes for children who have recently had rheumatic fever. The children are kept in these homes for a period of many months under somewhat the same regime as tuberculous children. It has been found that children so treated have a better chance of permanently overcoming their infection than have children who are allowed to resume activity without the long period of rest and care. Salicylate therapy has been used for years and has a striking effect in relieving the acute symptoms in the joints and also in decreasing the fever. It is properly given in large doses of 100 to 200 grains a day for an adult, and most physicians choose to accompany its administration by sodium bicarbonate in at least equal amounts in an effort to increase the gastric tolerance to the drug. In those cases in which it can not be given by mouth the rectal administration proves very satisfactory. Although it is frequently given in smaller, continued doses for the rheumatic endocarditis, conclusive evidence has yet to be presented that this group of drugs has any effect in altering the cardiac process. One further point should be emphasized in connection with the salicylate therapy. It is clinical knowledge that the arthritic symptoms of rheumatic fever tend to run in cycles. Thus, the acute joint manifestations will tend to subside in about two weeks, and in many cases this initial cycle will be followed by one or more subsequent cycles usually of less intensity. During the subsequent cycles, the fever will reappear roughly in proportion to the acuteness of the joint symptoms. Care must, therefore, be exercised, if the patient be on salicylates from the onset, that the activity of the later cycles is not submerged by the drug and its presence thus overlooked by those in attendance. It is thus well before permitting the patient to leave his bed to observe him closely for a period of days after the salicylates have been discontinued. In most of the cases of rheumatic fever a definite secondary anemia is present. On account of this the level of the food intake should be kept as high as possible, and in many cases it is well, in addition, to administer iron in proper dosage.

The question of prognosis in cases of rheumatic heart disease is often difficult. The reason for this is the pernicious tendency to recurrences which is one of the basic characteristics of the disease. The prognosis in general may be said to be good for any individual acute attack but more remotely to be poor. The younger the individual is when he first contracts the disease the more serious the ultimate prognosis usually becomes. In other words, with rheumatic fever a disease of youth and adolescence, the younger the individual is at the time of his initial attack, the more the possibility is of his developing subsequent attacks. The majority who contract the disease in childhood and whose first attack or subsequent attacks produce marked cardiac changes die of their cardiac impairment usually before the age of 40. As has been mentioned before, a most important point for consideration at the time any case is seen is whether there are evidences of activity at the moment. If there are, the cardiac impairment may progress to a degree that is not compatible with life. In the opposite sense, if a case is seen in which valvular heart damage is evident but not sufficient to greatly impair function, and in which all history of rheumatic activity is several or many years in the background, the prognosis is naturally much better. In such a case it can be seen that there is enough cardiac reserve remaining to maintain the customary activities of life, and there is less danger of renewed rheumatic infection on account of the years' quiescence. In all its complexities, rheumatic fever presents one of the most difficult ailments that a physician is called upon to treat. It requires his ever alert attention over a period of years, and very trivial symptoms often merit the utmost respect.

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Science Series. No. 2

THE FUNCTIONS OF THE SPLEEN

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To Joseph Barcroft, Professor of Physiology of Cambridge University, is due a great deal of credit for our modern concept of the functions of the spleen. On a scientific expedition to the Andes to study the alterations in hemoglobin caused by high altitude he noted the peculiar fact that while in tropical waters the blood volume and the hemoglobin of the scientists increased. Suspecting the tropical heat as the cause of this phenomenon, but being British and loath to form hasty, immature conclusions, Barcroft delayed answering the questions aroused by this observation. Back in Cambridge in 1923, with the aid of colleagues, Davies and Foster, and the University's famed glass room, Barcroft definitely determined the influence of temperature upon blood volume and hemoglobin. In his own words he found "the changes were just such as had taken place at sea and most clearly were due to rise in temperature. The physiological significance is clear enough; large cutaneous vascular areas are opened up in response to the heat, the blood to fill them must come from elsewhere, and as 'elsewhere' may have need of it, it is desirable to have a volume of blood commensurate with the size of the vascular bed."

In his effort to get at the bottom of this pump-like, automatic blood-transfusion reaction to rise in temperature, Barcroft sought a structure within the organism equipped: (1) to store mature red blood corpuscles in a reservoir outside but within easy access of the endothelial-lined vascular apparatus; (2) to expel the blood's cytological units from such a reservoir into the vascular system in response to emergency demands of the animal for more blood.

Nowise deterred by current and rather fanciful ideas associated with the structure and functions of Galen's abdominal "organ full of mystery," the Cambridge investigators focused their attention on the spleen and plunged into a series of brilliant experiments that are now history. The development, volume, architecture, peculiar blood and nerve supply, and contractile powers of the spleen were studied all over again with renewed enthusiasm and the thoroughness of the true investigator. Today, with the help of Barcroft and other physiologists, biochemists and clinicians, we are in a position to pen the following summary of the spleen's known and probable functions:

1. Blood Formation.[*] In the latter part of fetal life the spleen is actively engaged in hematopoiesis. In physiologic and pathologic emergencies the spleen may resume this function after birth. Proliferation of splenic lymphoid tissue (Malpighian corpuscles) probably adds lymphocytes to the circulating blood. In certain diseased states (leukemias), nests of primitive white cells replace the cells of the splenic pulp, proliferate and produce enormous numbers of granulocytes or lymphocytes which find their way into the general circulation.

2. Blood Destruction. The cells of the reticulo-endothelial system of the spleen ingest and disintegrate senile red blood corpuscles. Iron is removed from the salvaged hemoglobin, temporarily stored in the spleen, ultimately transferred to the liver and bone marrow for utilization in erythropoïesis. The iron-free portion of the hemoglobin molecule is converted into bilirubin, transferred via the portal circulation to the liver and excreted in the bile.

3. Reservoir for Red Blood Corpuscles. The splenic pulp probably acts as a reservoir or "parking space" for many red blood corpuscles which enter the splenic pulp via apertures in the ellipsoids surrounding the terminals of the splenic arteries. Corpuscles retained in the splenic "backwater," in case of emergency, may be pushed by splenic contractions into the systemic circulation via stigmata in the walls of the splenic veins. Splenic contractions are probably controlled by impulses transmitted along the sympathetic unit of the autonomic nervous system and by certain autocdids. Anoxemia, adrenaline and digestive activity (? secretin) are known to influence splenic contraction. Some maintain that the corpuscles retained within the splenic pulp are more fragile than those in circulation.

4. Lipoid Reservoir. The storage of considerable lipoid material in the reticulo-endothelial cells of the spleen is said to accompany conditions in which blood cholesterol is high. The part played by the spleen in lipoid metabolism is, at this writing, obscure.

5. Defense Reactions. In some ill-understood way the spleen seems to be definitely associated with the manufacture of hemolytic antibodies. Investigators have found that splenectomized animals cannot be immunized against tetanus toxin and that diphtheria toxin, detained in the spleen, is temporarily prevented from harming the organism as a whole. Undoubtedly the spleen with its reticulo-endothelial units plays an important rôle in defending the organism against infection, but we are at present without information concerning the mechanism it employs.

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[*] It has been suggested that a splenic hormone excites hematopoiesis in the bone marrow.

THE OBLIGATIONS OF THE MEDICAL PROFESSION—E. STARR JUDD, M.D. "The individual relationship of the physician and the patient is now and always will be the crux of medical practice. The fact that several plans for public relations have been worked out and put into operation shows that the profession is aware of the social and industrial changes that are taking place, and that it is making the necessary changes and fulfilling its obligations. With all of this development, however, unless the intimate personal relationship between physician and patient is maintained, it will not be possible to obtain for the patient the kind of service that the majority of American citizens are entitled to and will demand. No plan yet suggested seems to fit all communities, for the problems vary in different places. One thing I am certain of, however, is that whether caring for the sick is done by private practice, group practice, clinics, or guilds, it must be continued on a personal basis.

Routine procedures, with established compensation and reward, would not only destroy all enthusiasm for the development of the art of the practice of medicine, but would also take away all stimulation and initiative for investigation and research."—*Extract from the President's address before the American Medicol Association at the Eighty-second Annual Session, Philadelphio, June 9, 1931. Reprinted from the Journal of the A.M.A., June 13, 1931.*

MEDICAL ANNALS
of the
DISTRICT OF COLUMBIA

Published monthly by the Medical Society of the District of Columbia, 1718 M Street

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YOUR JOURNAL

The first issue of the Annals aroused a great deal of favorable comment, both from the members of the Society and from others. It was very gratifying to the editors, who realize their lack of experience, to receive a note of congratulation from Dr. Morris Fishbein, editor of the *Journal of the American Medical Association.* The scientific articles in the Annals will be indexed in the *Quarterly Cumulative Index Medicus*, so that contributors may be assured that a record of their work will be preserved in the body of medical literature.

The editors are extremely anxious to make the Annals, which corresponds to a State Society publication, the best of its kind. To do this they must receive the whole-hearted coöperation of the members of the Society. The medical profession in Washington can easily support scientifically such a journal. The editors wish to impress upon the members of the Society that this is their publication and that they should take pride in its development. Many of the articles which they are now sending to other journals might well be published in the Annals. From the standpoint of scientific attainment the goal of the editors is to publish articles containing original thought and the results of clinical investigation. Contributors should follow instructions regarding manuscript and illustrations which are given on the third page from the last in the Annals.

ADVERTISEMENTS IN THE ANNALS

The Medical Annals contains a distinctive advertising section. Extreme care is utilized to afford its readers reliable information concerning supplies and tradesmen. The American Medical Association has been a source of much assistance through its Coöperative Medical Advertising Bureau in the development of advertising service for medical publications of constituent State Societies. All pharmaceutical advertising conforms to the standards of the Council on Pharmacy and Chemistry. A stamp of approval coming from this Council should immediately dispel any doubt as to the honesty of statements made in the advertising columns and also as to the probable efficacy of a product.

The Medical Society of the District of Columbia in its unique position covering an entirely urban area has intimate contact with the firms which furnish service to Washington physicians. The appearance of a firm's name in the advertising columns of the Annals means that the editors are of the opinion that its service and products may be relied upon to be exactly as represented.

Before the Council on Pharmacy and Chemistry of the American Medical Association was established, the medical profession was flooded with nostrums. These products are now rightly excluded from consideration by the Coöperative Medical Advertising Bureau and the journals it represents. Readers, both those residing in Washington and its environs and at a considerable distance, are urged to consult freely and with confidence the advertising pages. Physicians may write directly to the firms listed, to the Society's office, or the Coöperative Medical Advertising Bureau, 535 North Dearborn Street, Chicago, Illinois, for any further details as to products or service.

TRANSACTIONS OF THE SOCIETY

Stated Meeting Held January 6, 1932

The following resolutions were unanimously adopted:

I

Whereas, It has come to the attention of the Medical Society of the District of Columbia that a movement is under way to remove the Surgeon General's Library to a location in the vicinity of the Library of Congress; and

Whereas, It is well known that the Surgeon General's Library was founded and has been built up to its present unique position by the Medical Department of the Army; and

Whereas, The United States Congress in 1919 and 1922 appropriated money for a site for the Surgeon General's Library at the Army Medical Center, which site has been purchased and is now available without further cost; and

Whereas, It is essential for the completion of the Army Medical Center that a Medical Library be established there; and

Whereas, The location of the Surgeon General's Library at the Army Medical Center will in no way interfere with its use by civilian physicians; therefore be it

Resolved, That the Medical Society of the District of Columbia deprecates the passage of any legislation which would remove the Surgeon General's Library from the control of the Surgeon General of the Army or which would prevent its location in the Army Medical Center in close relation to the Walter Reed General Hospital and the Army Medical School; and be it

Further Resolved, That a copy of this resolution be furnished to the Chairman of the Legislative Committee for the information and guidance of that committee and a copy be furnished to the Surgeon General of the Army.

II

Whereas, The President of the Medical Society of the District of Columbia, Dr. Arthur C. Christie, has been honored within recent weeks by election to the chairmanship of the Board of Trustees of The American University; and further, by selection as President of the Young Men's Christian Association of Washington; be it

Resolved, That the Medical Society of the District of Columbia extends to its President its congratulations and felicitations on the signal and well deserved honors which have been conferred upon him and wish him all success in the discharge of the obligations of the newer offices he has assumed.

The following were duly elected to membership:

Honorary Membership

Chevalier Jackson, Philadelphia, Penna.

Active Membership

William Francis Burke, The Farragut.
John Richard Cavanagh, 2804 Rhode Island Avenue, N.E.
Vincent Joseph Dardinski, Georgetown University Medical School.
Perry William Gard, 1606 Twentieth Street, N.W.
Frank Marian Hand, 901 Sixteenth Street, N.W.
José Guillermo Lewis, 1400 M Street, N.W.
George Henry McLain, 2015 Que Street, N.W.
John Edward Gorsuch McLain, The Farragut.
Willis Brown Morse, 666 Maryland Avenue, N.E.
Paul Joseph O'Donnell, 1835 Eye Street, N.W.
Ella Oppenheimer, (Formerly Associate Member) 526 Maple Ridge Road, Bethesda, Md.
Laurence Stephen Otell, 1835 Eye Street, N.W.
Howard Pope Parker, 1835 Eye Street, N.W.
Edna Patterson-Burgeson, Washington Sanitarium, Takoma Park, D. C.
John Charles Reisinger, 1720 Connecticut Avenue, N.W.
Ignatius Rutkoski, 1411 Manchester Lane, N.W.
Daniel Boone Washington, 6234 Georgia Avenue, N.W.
Richard Wallace Wilkinson, 1408 L Street, N.W.
John deButts Wynkoop, 1801 Eye Street, N.W.

Associate Membership

William Hemphill Bell, Captain, U.S.N., 1869 Wyoming Avenue, N.W.
Irving M. Cashell (V.M.D.), 2807 Eighteenth Street, N.W.
Frederick John Cullen, Potomac Park Apartment.
Alice Heyl Kiessling, West Falls Church, Virginia.
Oscar Lavine, 3628 Thirty-fourth Street, Mt. Ranier, Md.
Daniel Francis Lynch, (D.D.S.), 1149 Sixteenth Street, N.W.
Arthur MacDonald, 314 East Capitol Street.
Bruce Linville Taylor, (D.D.S.), 815 Eighteenth Street, N.W.

Applicants for membership to be voted on in March, 1932:

For Active Membership

Gervase James Patterson Barger, George Washington University—1914.
Depue Hazen Duffey, George Washington University—1928.
John Henry Elvin, College of Medical Evangelists, California—1930.
Joseph LeRoy Gilbert, Creighton University—1919.
Russel Jon Jansen, George Washington University—1926.
Leslie Keith MacClatchie, Rush Medical College—1927.
Charles Harold McEnerney, Georgetown University—1919. (Formerly Associate.)
Earl Baldwin McKinley, University of Michigan—1922.
Millard Frederick Ottman, George Washington Univesity—1927.
Sam Lester Tabb, George Washington University—1930.
Archibald W. Truman, University of Colorado—1908.
Ernest Lee Yost, Georgetown University—1920.

For Associate Membership

James C. Kimbrough, Vanderbilt University—1916.

Changes in membership:

Status changed from Active to Associate Membership: William H. Syme.

Resigned from Active Membership: Taylor B. Dixon.

Resigned from Associate Membership: Carlos Leiva.

Pursuant to Article V, Section 10 of the Constitution, the following names were automatically dropped from the rolls as of December 31, 1931:

Active Members

Ralph Cohen
Emelie Andersen DeEds
Edward A. Krause
John Morris Ladd
Carl J. Larsen
Joseph John McHale
Alfred V. Parsons
Anthony B. Schilling
Richard Francis Shaw

Associate Member

Elmar Stebbins Waring

Amendments to the Constitution and By-laws adopted:

1. Transfer Article II, Section 2, of the By-laws to Article IV, Section 7, of the Constitution. The Section involved reads as follows:

> "No matter involving an expression of the opinion of the Society in public matters whall be considered or voted on, except after due notice of the subject and time of its consideration shall have been sent to all the active members."

2. Change Article VII, Section 4, of the Constitution to read as follows:

> "The Committee of Censors shall investigate and report upon applications for membership; and it shall receive all complaints and evidence of alleged unprofessional and unethical practice and malpractice by members of this Society and if in its opinion the complaint or evidence is well founded, it shall prepare against the accused charges in writing, stating the facts in detail and forward them to the Executive Committee. If the Committee of Censors decides that there is no ground for action against the accused and the member making the complaint does not agree with the decision, the complainant may then prepare charges in writing, stating the facts in detail and forward them to the Executive Committee."

3. Amend Article V, Section 8, of the Constitution by adding in line 6, after the word "Society," the phrase "or of unprofessional or unethical practice or malpractice of which the Committee shall be exclusive judge." Section 8 would then read,

> ". . . Should this committee by a two-third vote find the accused guilty of a violation of the regulations of the Society, or of unprofessional or unethical practice or malpractice of which the Committee shall be exclusive judge, it shall submit its report and recommendations in writing to the Society, . . . "

4. To Article VIII, Section 2 of the Constitution, pertaining to Sections of the Society, add—"Section 11, on neoplastic diseases."

FORTY YEARS OF MEMBERSHIP

Pursuant to Article V, Section 10 of the Constitution, "members of the Society who have had forty years of continuous active membership shall be absolved from the payment of any further dues or assessments." The names of the following members were read:

Seniority Number	*Election to Membership*
108—John Edgar Walsh	May 23, 1891
111—Francis A. St. Clair	May 27, 1891
114—John Thomas Kelley, Jr.	June 1, 1891
119—Steuart Brown Muncaster	October, 1891
120—Isaac Scott Stone	October, 1891
121—Robert W. Baker	October, 1891

It is pleasant to extend a greeting to members who have completed almost a half century on the Society rolls. Their attendance at meetings and their general support to organized medicine have been appreciated. This does not mean that they are to become less active; indeed, it is hoped that they may be continued on the roster of active members for many years to come.

PROGRAM, SOCIETY ACTIVITIES FEBRUARY, 1932

February 3: Business Meeting. Following the business session Dr. Georges Portmann, Professor of Laryngology at the University of Bordeaux, will address the Society.

February 10:

1. Dr. Francis R. Hagner: "Report of Case of Traumatic Rupture of the Kidney."
2. Dr. Ralph M. LeComte: "Treatment of Prostatism by Endoscopic Revision."

February 17: Program to be furnished by the Hippocrates-Galen Society.*

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* The coördinating of the splendid work accomplished by local Societies of limited membership in this manner is a source of helpfulness in promoting unity of professional effort in Washington.

February 24: Program to be furnished by the Section on Ophthalmology and Oto-Laryngology.

PROGRAM, SECTION ON NERVOUS AND MENTAL DISEASES, FEBRUARY 4, 1932

1. "Cerebral Aneurysm. Case report with presentation of patient." Dr. Hyman Shapiro.
2. "Compression Myelitis. Case reports with presentation of specimens." Dr. Karl H. Langenstrass.
3. "Colloidal Theory of the Catatonic Reaction." Dr. Dexter M. Bullard.

PROGRAM, SOCIETY OF HOSPITAL INTERNS OF THE DISTRICT OF COLUMBIA FOR FEBRUARY*

The meetings of the Society of Interns are held on specified Wednesdays at 7 p.m. All members of the Medical Society are invited.

February 3: "Preparation for Specialization." Dr. Wm. Gerry Morgan.

February 17: "The Doctor and His Accounts." Dr. J. Russell Verbrycke, Jr.

ACTIVITIES, CIVIC HEALTH COMMITTEE

Charles Stanley White, *Chairman*,
John H. Lyons,
Harry S. Bernton,
S. R. Karpeles,
Gregg C. Birdsall, *members*

A continuation of the Sunday afternoon Public Health Talks which have proved successful in informing the laymen concerning medical truths will include the following speakers:

February 21: Dr. C. C. Little, Director General, American Society for the Control of Cancer. "Cancer."

March 13: Mr. Karl De Schweinitz, In Association with the Social Hygiene Society of the District of Columbia. "The New Family."

April 3: Dr. Kendall Emerson, Director, National Tuberculosis Association. "Tuberculosis."

April 24:

Dr. Prentiss Willson. "Prenatal Care."
Dr. Joseph S. Wall. "Child Hygiene."

On January 31, in the Medical Society Building, 1718 M Street, a symposium on "Appendicitis" was presented by Drs. Wm. Earl Clark, Edwin A. Merritt and Harry H. Kerr before a representative audience of Washington citizens. Many facts were stressed which should tend to bring much closer coöperation between the public and the physician in fighting this disease. The rise of the mortality curve was mentioned; the talks by an internist, roentgenologist and a surgeon should go a long way toward aiding in the preventing of disastrous consequences of the delay, frequently with the accompaniment of administration of drastic purgatives, before the physician is consulted.

Members of the Society are urged to send cards of invitation to these meetings to their clientele.

OBITUARY NOTICE

Nelson Gapen died in Washington, D. C., on January 7, 1932, of mastoiditis and meningitis, aged 53 years. He was born in Washington, D. C., where he attended public school and graduated from Georgetown University School of Medicine in 1900. He served an interneship in Garfield Memorial Hospital, and entered the Medical Corps of the United States Army in 1902, and graduated from the Army Medical School in 1903. He served in the United States and in the Philippine Islands, and rose to the grade of Lieutenant Colonel, in which grade he was retired from active duty in 1917. His membership in the Society dates from November 5, 1919. He was recalled to active duty during the remainder of the World War, and was made a Colonel in 1930. Following the World War he served as medical superintendent of the Mary Imogene Bassett Hospital in Cooperstown, New York, for about two years, and then returned to his alma mater, where he served as professor of materia medica, pharmacology, and therapeutics until his death.

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* In affiliation with the Medical Society of the District of Columbia.

The Medical Society suffered an irreparable loss in the death of **Dr. Reginald R. Walker** on Friday, January fifteenth. Dr. Walker had been a member of the Society since October 14, 1901. As an oto-laryngologist he was probably unsurpassed in the East. He was born in the District of Columbia on March 5, 1877, and lived during his entire lifetime in this, his native city. Because of his sterling qualities and lovable personality he surrounded himself with a host of close friends not only among the physicians but in the community at large. He was generous almost to a fault, always being ready to contribute to every worthwhile cause both in personal services as well as in gifts of money. Dr. Walker will be keenly missed whenever medical men foregather.

SCHOOL NEWS

A New Method of Experimental Hepatectomy

A simple one-stage technique for removing the dog's liver has been recently developed by J. Markowitz, Wallace M. Yater and W. H. Burrows, at Georgetown University School of Medicine. This method consists in reconstructing the hepatic portion of the inferior vena cava by a paraffined glass cannula. A straight Eck fistula is then rapidly performed. The vena cava is next tied between the liver and the diaphragm around the cannula. The liver can then be removed by cutting between the ligatures around the vena cava. Animals so prepared are in as good condition as those prepared by the older multiple-stage methods. A full account of the method will appear elsewhere.

Medical School Builds Addition

The George Washington University Medical School has nearly doubled its floor space by the building of a new wing. Laboratory facilities, opportunity for intensive teaching and research, will be provided for all departments. There will be a floor provided for clinical laboratory procedures. Adjoining the room in which specimens from the University Hospital are examined, will be located a large laboratory for the teaching of clinical microscopy. On one of the floors there will be an opportunity for both teaching and research in bacteriology, hygiene and public health. It is not contemplated that there will be given the degree of D.P.H., but that a fully qualified expert will be in charge and a stimulus will be given to both students and graduates who are undertaking investigative work. There will be a floor where the laboratory of Dr. Earl Baldwin McKinley will be located, with space for his personal library. Here are furnished space and equipment for teaching bacteriology. A most modern operating room, with facilities for animals will be provided on another floor. The equipment will provide everything that has proven best for the hygienic and humane care of the animals so necessary for investigative work.

Ready contact is provided with the older medical building on the several floors. The new building at the present time is being pushed toward completion. Although it is not planned to build a structure of great permanence, the equipment throughout is of the very best and is designed for continuance in use at such time as a new George Washington University Medical Center will be erected.

Medical Alumni Meet

At the regular monthly meeting of the George Washington University Medical Society, January 16, 1932, with an attendance of over 150 two papers of unusual interest were presented. The first essayist, Dr. Carl C. Speidel, Professor of Anatomy, Medical School of the University of Virginia, was introduced by Dr. Frederick A. Reuter, President of the Society. Doctor Speidel gave a description of the vital processes occurring during growth and regeneration of living nerves, observed for the first time by utilizing the tail fin of the tadpole. The microscopic observations are made directly, after slightly anesthetizing the tadpoles. "This work is in its infancy," he stated, "there are many new facts relative thereto which will be brought out in the near future." Doctor Speidel's discovery in this field has attracted the attention of the lay scientific profession as well as the medical. For his accomplishments he received the annual award for 1931 of the American Association for the Advancement of Science. The paper was discussed by Dean Earl B. McKinley and Dr. George B. Jenkins.

The second essayist, Dr. Robert L. Payne, Chief Surgeon, St. Vincent's Hospital, Norfolk, Virginia, who was introduced by Dr. Daniel L. Borden, gave a critical review of 1,145 cases of uterine fibromyomata treated by surgery or radium over a period of ten years. He suggested that a decision as to the mode of treatment should be made only after careful individualization of each patient. Among those discussing this paper were Drs. Charles S. White and Thomas A. Groover.

Invited guests included members of the Army and Navy Medical Corps, and the United States Public Health Service.

Annual Banquet

The annual banquet of the George Washington University Medical Alumni for 1932 will be held on Saturday, February 20, 7:30 p.m. at the Willard Hotel, Washington, D. C. Dr. E. Starr Judd, President of the American Medical Association, and Chief Surgeon of the Mayo Clinic, will be the guest speaker. President Cloyd Heck Marvin and Dean Earl B. McKinley will be present, and many out-of-town alumni are expected to be present. This occasion will give an opportunity of renewing old friendships. The entertainment features will include the George Washington University Glee Club.

THE WOMAN'S AUXILIARY TO THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

A meeting of the Executive Board was held at the home of Mrs. Arthur C. Christie, President of the Auxiliary, on January 6, 1932. After the business meeting, delicious refreshments were served in the dining room.

Mrs. Prentiss Willson is in charge of the unit which is carrying on the Red Cross work of the Woman's Auxiliary, which meets Wednesday mornings, 10 to 12 o'clock.

Our National President, Mrs. Walter Jackson Freeman, Philadelphia, is just home after a long visit in Europe.

In her message for the New Year, the National President of the Woman's Auxiliary to the American Medical Association urges that every State and county auxiliary work under the direction of an advisory council of doctors or a counsellor appointed by its Medical Society, and that each State president reporting at the New Orleans meeting may be able to say that her State Auxiliary and each of its constituent county units has such an advisory council or counsellor.

The word "auxiliary" means aid and support, and we can organize only with the doctors' consent and backing. The Auxiliary is the only organization in which we live up to what our husbands tell us. Auxiliaries thrive where they receive encouragement from the physicians themselves. The one thing we are all interested in is the doctor and his problems, and we can learn about these through the Auxiliary. There is no other such organization in existence: mothers, widows, wives, and daughters; all are members.

The Auxiliary activities fall into three groups: social, philanthropic, and educational. The importance of the social activities of an Auxiliary must not be underestimated, as they tend to bring about unity and solidarity within the profession by means of social contacts between the families of doctors. The philanthropic activities of the auxiliary need not be a duplication of the work of other women's organizations, as the philanthropic work done by the Auxiliary usually is closely related to the work of the medical profession: participation in Christmas seal sales of the Tuberculosis Societies; various types of work for hospitals, sanitoriums, and preventoriums; scholarship funds for medical students and students of nursing; contributions to the medical benevolent funds; contributions to memorials established or approved by Medical Societies.

Many of the auxiliaries are taking an active interest in education and public relations, and many state Medical Societies have prepared educational programs for their auxiliaries and have endorsed the National Auxiliary study envelopes for use in developing these programs. Some of the women in a number of auxiliaries have taken a marked interest in the educational programs, and are active in interpreting the ideals and work of the medical profession to other women's organizations with which they are associated, especially by influencing these groups in the choice of approved literature and speakers to be used on their health programs.

Excellent public relations activities and philanthropic work are reported from the Mississippi Auxiliary. A contribution of $2,500 has been made by the Auxiliary to the preventorium fund for the Sanitorium.

Several of the State auxiliaries now have a portion of the time of an Assistant Executive Secretary appointed by their respective Medical Societies: Minnesota, Illinois, and Wisconsin report such coöperation.

The Kentucky Auxiliary now issues a "Quarterly," the first bulletin to be issued by a State Auxiliary.

Mrs. Eugene R. Whitmore, *Chairman,*
Committee of Press and Publicity.

ACTIVITIES OF SECTIONS
FEBRUARY

Section on Internal Medicine, C. R. L. Halley, Chairman, meeting Friday, February 26th, 8 P.M.:

1. "Contributions to the Physiology and Pharmacology of Vomiting," T. Koppanyi, Ph.D., Professor of Phamacology, Georgetown University.
2. "Recent Advances Concerning the Etiology of Peptic Ulcer," J. Markowitz, M.D., Professor of Physiology, Georgetown University.

Section on Nervous and Mental Diseases, at recent meeting elected the following officers: D. Percy Hickling, Chairman; Dexter M. Bullard, Vice Chairman; Walter Freeman, Secretary-Treasurer; Executive Committee, H. D. Shapiro, Mary O'Malley, Harry H. Kerr and the officers, ex officio. The members of the Society are cordially invited to join this Section, and attend its meetings, which are held the first Thursday of the month.

Section on Ophthalmology and Oto-Laryngology, Carl Henning, Chairman, meeting with the Society, Wednesday, February 24th:

1. "Carcinoma of the Larynx," Fielding Lewis, M.D., Professor of Laryngology, University of Pennsylvania Graduate School.
2. "Some Points in the Management of Strabismus," John H. Dunnington, M.D., Associate Professor of Ophthalmology, Columbia Medical Center, New York City.

PROFESSIONAL STAFF OF GALLINGER MUNICIPAL HOSPITAL FOR 1932

(Dr. Edgar A. Bocock, Superintendent)

1. DEPARTMENT OF MEDICINE

Head of Department—Dr. Wallace M. Yater

A. Chiefs of Service—General Medicine

Dr. Wm. P. Argy
Dr. Worth B. Daniels
Dr. B. W. Leonard
Dr. Geo. R. Huffman
Dr. Coursen B. Conklin
Dr. Stuart O. Foster
Dr. Maurice Protas
Dr. Frank A. Hornaday

B. Associates—General Medicine

Dr. Aloysius Connolly
Dr. Isadore Rodis
Dr. Samuel Benjamin
Dr. Frank R. Shea
Dr. Harry Friedenburg
Dr. Marvin M. McLean
Dr. Nicholas Mandelos
Dr. Arnold McNitt

C. Visiting Physicians—Pediatrics

Dr. Wm. F. O'Donnell
Dr. Harry A. Spigel
Dr. J. J. Greenlaw
Dr. Harry A. Ong
Dr. Margaret M. Nicholson
Dr. Montgomery Blair, Jr.

D. Visiting Physicians—Contagious Diseases

Dr. Robert J. Conlon
Dr. Carl Goldenberg
Dr. J. A. Rolls
————

E. Visiting Physicians—Dermatology

Dr. Jos. Kennedy
Dr. Russell Fields
Dr. I. Louis Sandler
Dr. C. A. Simpson
Dr. H. F. Anderson
————

2. DEPARTMENT OF SURGERY

Head of Department—Dr. Charles S. White

A. Chiefs of Service—General Surgery

Dr. Howard F. Strine
Dr. Dunlap P. Penhallow
Dr. Fred R. Sanderson
Dr. Robert E. Moran
Dr. Warren W. Sager
Dr. Paul Putzki
Dr. Alec Horwitz
Dr. Arch L. Riddick

B. Associates—General Surgery

Dr. Geo. K. Nutting
Dr. M. E. Donahue
Dr. J. E. Virnstein
Dr. Fred Fisbback
Dr. Ben. F. Dean
Dr. Valentine M. Hess
Dr. Eugene Cole
Dr. Howard L. Smith
Dr. Wm. Chase

C. Visiting Surgeons—Orthopedics

Dr. John A. Talbot, Chief
Dr. E. A. Kelley
Dr. Paul O'Donnell
————
————
Dr. Custis L. Hall, Chief
Dr. Guy W. Leadbetter, Chief
Dr. Phillip O. Pelland
Dr. Julius S. Neviaser
Dr. F. M. Hand

D. Visiting Surgeons—Ophthalmology

Dr. E. J. Cummings
Dr. James N. Greear
Dr. Wm. C. Plumber
————
Dr. Wm. T. Davis, Chief
Dr. Chas. L. Billard
Dr. Wm. T. Burch
Dr. Ernest Sheppard
Dr. G. Victor Simpson

E. Visiting Surgeons—Otolaryngology

Dr. Harry Davies
Dr. Wm. A. Morgan
Dr. P. S. Constantinople
Dr. V. A. Alfaro
Dr. R. W. Wilkinson
————
Dr. Richard L. DeSaussure
Dr. Lyman B. Tibbets
Dr. Don Johnson
Dr. David Davis
Dr. Hugh O. House
————

F. Visiting Surgeons—Urology

Dr. J. S. Rosenthal
Dr. J. F. Rogers
Dr. Ivy Pelzman
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TUBERCULOSIS ABSTRACTS

This Review Issued Monthly by the National Tuberculosis Association is Furnished by the Association for the Prevention of Tuberculosis of the District of Columbia.

THIS year marks the fiftieth anniversary of the discovery of the tubercle bacillus by Koch. That event gave intelligence and direction to man's attempt to master his age-old enemy. During the past three decades, the fight has become an organized one. The decline in the death rate has shown consistent acceleration, though a decisive victory is not yet within grasp. At this fitting period in the movement, P. P. Jacobs, veteran tuberculosis worker, gives us a lucid statement of the present situation in his book, "The Control of Tuberculosis in the United States." To give a balanced picture of the contents of this tersely written volume on a very broad subject is impossible—a few highlights must suffice to suggest its general flavor.

PRESENT STATUS OF TUBERCULOSIS CONTROL

In 1889, Hermann Biggs, at the request of the Commissioner of Health of New York City, formulated a statement concerning the communicability of tuberculosis and outlining a plan of attack against it. Indifference and antagonism greeted the plan, for Biggs was far ahead of his time. The Commissioner nevertheless issued a circular on "Contagious Consumption," and this marks the first step in the educational campaign. Four years later, Biggs' original report formed the nucleus of a more complete scheme. The struggle to secure its adoption was tedious but succeeded at last.

Briefly, the program recommended included (1) education of the public, (2) compulsory reporting of cases by public institutions and the recommendation that physicians report private cases, (3) home visitation of patients, (4) the provision by general hospitals of separate wards for tuberculous patients, (5) the provision of a "consumptive hospital," (6) the establishment of laboratory facilities. In time, other measures, such as public health nursing, clinic service, organization of voluntary associations, sanitary measures, etc., were added. The compulsory notification of tuberculosis by all physicians and householders became law in 1897.

Meantime, Sir Robert Philip in Scotland was steadily establishing "The Edinburgh Anti-Tuberculosis Scheme," first proposed in 1887. His plan emphasized the need of searching out cases at home and pivoted about the out-patient departments of hospitals. This gave the movement in Great Britain a somewhat different trend but also influenced American thought. In the United States, the campaign was characterized by the participation of non-official agencies. Well organized health departments were few; there was need for leadership. The first voluntary organization was the Pennsylvania Tuberculosis Society, founded in 1892. Others followed, and in 1904 the National Tuberculosis Association came into being with Trudeau as its first president. The Sixth International Congress on Tuberculosis, held in Washington in 1908, crystalized opinion and unified the several efforts into a nation-wide movement.

METHODS OF CONTROL

Part II of the book describes the methods employed in the control of tuberculosis. The most important premise of the founders was that an enlightened public opinion is essential in any scheme of tuberculosis control, and further that sound knowledge about the disease is the individual's chief protection. The keynote, therefore, was education. Early efforts in this direction were naturally somewhat awkward but soon became surprisingly effective. With experience has come the conviction that the process of stirring the people out of their lethargy and enlightening them, vaguely expressed in the magic word, "education," depends upon certain techniques of publicity and organization.

The molding of public opinion, the establishment of control machinery, the maintenance of treatment facilities and so on, involve procedures which are today fairly well standardized. Separate chapters of Part II deal individually with these methods. A few chapter headings will serve as examples: Adult Health Education; The Spoken Word; Child Health Education; Case Finding; Statistics and Surveys; Fund Raising.

SCIENTIFIC BASIS OF CONTROL

Part III addresses itself to the fundamental policies of the tuberculosis movement in the United States, one chapter of which deals with the scientific basis of the program of action. New discoveries have gradually influenced the movement. For example, at first little distinction was made between minute or gradual dosage of tubercle bacilli and massive dosage. Many fondly hoped that it was possible to control infection by such measures as those directed against spitting. Modern conceptions of infection have greatly modified this hypothesis.

The first postulate accepted today is that the tubercle bacillus, the sole direct cause of tuberculosis, is passed from man to man and from cattle to man. It is conceded that at least 90 per cent of infection is transmitted directly from one human being to another by sneezing, coughing, kissing, etc., and by direct contact with moist or dried tuberculous sputum. Dust-borne infection is probably of minor consequence.

The prevalence of infection rises gradually from infancy until at adult life it may include some 80 to 95 per cent of the adult population. Morbidity or actual disease, however, is relatively very low. A long interval usually elapses between infection and the manifestations of disease, but these are not uncommonly precipitated by collateral events in the life of the individual. The ultimate suppression of tuberculosis is held by some to be a possibility.

The events leading to disease follow a fairly definite sequence. The influence of heredity has been discarded, but the infant born in a tuberculous *milieu* can hardly escape severe infection. Casual contact accounts for most cases of milder infection. The first infection, if severe (but not severe enough to cause immediate death) usually expresses itself in a primary focus, small or large, with involvement of the tracheobronchial lymph nodes. Concomitantly, allergy or sensitization is established. This physiologic-pathological complex is designated as childhood type of tuberculosis. The early pathology may disappear beyond recognition or it may remain latent many years, evidencing itself only by X-ray shadows. Very frequently, reinfection takes place in early adult life and, favored by circumstances that tax the resisting powers of the individual, the adult type of disease, characterized by destruction of tissue, may follow.

WHAT OF IMMUNITY?

Whether infection will fortify the body against further inroads of the tubercle bacillus or predispose it to the adult type is dependent upon various circumstances and influences, some of which can be controlled. Acquired immunity is insufficient to protect the individual against disease is repeated doses or an extremely large dose of bacilli enter the body. The contributory factors of tuberculosis morbidity include anything and everything that adversely influence the health of man. Attempts to produce artificial immunity have not yet succeeded. At the present time, it seems unwise to extend the use of BCG, except for experimental purposes.

The treatment of tuberculosis is based on the assumption that rest, fresh air, good food, and freedom from worry, plus medical supervision, will bring about a natural process of healing. Climate has little, if any, specific value, but there is much to be said in favor of certain types of air conditions. Surgery and light are important adjuncts to the treatment.

On these general premises, the plan for preventing and controlling the disease is based. While alarm is expressed by some to the effect that the detuberculization of the population may produce a race of high susceptibility to tuberculosis, others hold that increased intelligence and eternal vigilance will protect against a recurring disastrous infection.

Part IV describes a number of illustrative programs and thus brings to a focus the general principles discussed in previous chapters. Throughout the book, the reader desiring special information is referred to original and pertinent sources with a discrimination born of the rich experience of the author.—*The control of Tuberculosis in the United States*, *P. P. Jacobs, Ph.D.*

THE PROPER ADMINISTRATION OF DIGITALIS

Although there is much to the treatment of heart disease that does not concern itself with the use of drugs, the proper and intelligent administration of digitalis often decides whether or not the patient recovers and becomes ambulatory. Digitalis is a drug that cannot be given aimlessly, nor is it to be expected that the same results will be obtained under different conditions. There are times when it can be predicted that no particular good will come of its use, and other times when one would be surprised if a beneficial therapeutic response did not occur. The physician must at all times know in accurate terms the exact quantitative amount of digitalis that his patient is taking.

Let us first consider what kind of digitalis should be used. Whereas, fifteen or twenty years ago many preparations of digitalis in the open market were very inactive, unreliable, and varied in strength, nowadays practically all the different kinds of digitalis in general use are reliable, active, and accurately standardized. Formerly some of the digitalis, even that used in large good hospitals, was absolutely inert; now the main difference in the various preparations is the price. There is no need for a patient paying more than two cents for a trustworthy pill of digitalis containing one and one-half grains. There is practically no advantage of one preparation of the drug over another. When the drug salesman insists that his drug does not produce nausea, because it is a fat free tincture, or because it is prepared in a certain way, or because of some other assumed advantage, it will generally be found that in appropriate doses the same results will ensue that follow the use of any other digitalis, if it is active. One may maintain that if a form of digitalis will not produce nausea, it is not reliable. There is, therefore, no practical advantage of a chloroform extract over an aqueous extract, a fat free tincture over an ordinary tincture, or one pill over another.

It is customary to use either a tincture of digitalis or powdered leaves of digitalis in pill or tablet form. The latter has many advantages that recommend it. When using a pill or tablet the doctor can always know the exact amount his patient is taking. If a tincture is used, unless it is being accurately and intelligently measured, he does not know the exact amount. Often a patient is told to take five drops, three times a day, assuming that a drop is a minim. It will always be found that there will be between two and four drops of tincture of digitalis to a minim. A study of this question some years ago showed that 30 to 60 drops were equivalent to 15 minims or 1 cc., in different hospitals with different nurses and droppers. The variations were found to depend on three factors, i.e., the type of medicine dropper, the angle at which it was held, and the speed with which the drops fell. From this it follows that drop dosage is not accurate. Tinctures can be used very effectively if the proper amounts are given. It is much simpler for the patient and more accurate to use digitalis in pill form, and a convenient strength is one containing one grain and a half of digitalis.

It must be remembered that the dose of digitalis is not the same in all patients. The greater the body weight, the greater the required dose, but there are other individual variations not dependent on weight. While discussing dosage, it is well to bear in mind that 1 cc. of tincture, fifteen minims of tincture, 0.1 gram of digitalis and 1½ grains are all equivalents. In general an average adult who has not recently had digitalis will need about 30 grains, 2.0 grams, 20 cc. or 300 minims of tincture of digitalis, if given by mouth in the course of several days, in order to become digitalized. Some will need less and some more. Because of this variability the drug is given in divided doses until the desired effect is produced. Unless there is need for great haste, which is extremely rare, one pill of 1½ grains or its equivalent can be given four times a day for four to six days and then followed by a maintenance dose of one pill a day. The body is destroying or excreting about 1½ grains a day and therefore continuing that as a daily dose maintains the state obtained by the larger doses. It will be found at times that a smaller or a little larger dose will be desirable. If the patient has had digitalis just before treatment is started, the dosage necessary may be smaller. It is known that the drug taken by mouth has its effect in eight to twelve hours. Therefore, a physician will do well to examine his patient each morning during digitalization, for then he can detect the effects of the administration of the preceding day.

When should the dose of digitalis be diminished and what are the toxic manifestations? The dose should be diminished when the desired therapeutic results are obtained. These effects are a proper slowing of the heart rate, a diuresis, and an improvement in the dyspnea, cyanosis, oedema or other evidences of heart failure. The toxic effects are the development of nausea, vomiting, general feeling of sickness, and occasionally visual disturbances. There are also findings in the heart of toxic effects. If the heart were previously regular and there develop sudden pauses indicating heart block, although no harm is done, the dose must be diminished or omitted. If a previously regular heart develops extra systoles, especially if coupling of beats occurs, the drug should be omitted for a while. This coupling can best be detected by auscultation because the second beat of the couple is an extra systole and may not be palpable at the radial artery. There are certain rare conditions that are difficult to recognize at the bedside which indicate toxicity, but in the great majority of instances the above criteria will serve adequately in guiding digitalis dosage.

It must be remembered that although nausea and vomiting frequently result from too much digitalis, it often occurs in congestive heart failure, because of too little digitalis, especially when there is an engorged liver. Then the drug needs to be continued and if it is vomited, a satisfactory procedure is to give the tincture of digitalis by rectum. The rectal dose is about the same as the oral dose. Under such circumstances, 4 cc. of tincture can be given in 50 or 100 cc. of water by rectum once a day for a while, until mouth dosage can be tolerated.

It is most important to know when digitalis therapy is indicated. In general, heart failure of the congestive type is the primary indication for digitalis. It does not matter whether the blood pressure is very high or very low, whether there is aortic or mitral or no valvular disease. If there is congestive failure as evidenced by cardiac dyspnea, engorgement of the veins, pitting oedema and the like, digitalis should be given. If auricular fibrillation (absolute irregularity) is present, the heart rate should be slowed by digitalis; if the heart rhythm is regular, the slowing of the rate will be much less. Merely because the heart rate is rapid, as in pneumonia or other infections, is no reason for giving digitalis. Although there are occasionally other well defined conditions in which digitalis is of value, for the most part its use will be confined to the treatment of the congestive type of heart failure.—*Extract, Statistical Bulletin, Metropolitan Life Insurance Company, January, 1932.*

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THE PRESENT STATUS OF ROENTGEN AND RADIUM THERAPY*

E. A. MERRITT, M.D., THOMAS A. GROOVER, M.D., AND EDGAR M. MCPEAK, M.D.

This subject is much too broad in scope to be adequately covered by any treatise acceptable in length to the editor of the Annals. The fact, however, that no book on roentgen and radium therapy for the general practitioner or consultant is available, renders even a brief presentation of the subject desirable, and for convenience the contents are here arranged in encyclopedic form.

The number of diseases favorably influenced or cured by radiation therapy has shown a tremendous increase during the past decade, and the unexpected results of certain experiments are continually widening the field. The common belief that the roentgen rays and radium are applicable only to malignant disease has relegated them to the background or crowded them out of the picture entirely in the management of seventy-five or more other diseases. In fact, carcinoma and sarcoma represent only one group, and that not by any means the most favorable for the use of roentgen or radium therapy.

ACTION OF ROENTGEN RAYS AND RADIUM

Avoiding complicated and uncertain hypothesis it may be simply stated that their action on the cell is generally that of a depressant; function is disturbed, growth stopped, and degeneration or destruction induced according to the quantity of radiation absorbed and the sensitiveness of the cell to radiation. The apparent stimulating effect sometimes noted may be the reaction which follows depression, or it may be an actually stimulating effect on the reticulo-endothelial system. In any event an increase in leukocytes immediately follows proper exposure of the long bones to roentgen rays in cases of agranulocytic angina. So rapid and immediate is the response that a stimulating effect on the hematopoietic system is an inescapable conclusion.

Certain types of cells are more susceptible to the action of radiation than others; thus it is known, for instance, that lymphoid cells are easily destroyed wherever they may be found; the more nearly cells approach the embryonal type the more susceptible they are.

The glands of internal secretion, the reproductive organs, and the salivary glands are affected by doses which have little or no effect on the skin, connective tissue, blood vessels and nerve tissue. Similarly, rapidly growing malignant tumors are usually more readily affected than the slowly growing ones; this fact has given rise to a generally accepted law of the biological action of radiant energy, viz., that the rapidity of cell growth increases sensitivity to radiation.

Now roentgen treatments are given singly or in series. Diseases of the skin will require usually many fractional treatments, while some other diseases may be adequately treated by a single dose. The interval between treatments may vary from one to three weeks, or longer, depending upon the nature of the disease. The intensity of the treatment, the use of filters, and the distance at which the patient is treated are some of the factors which control the number and frequency of treatments.

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* From the Radiological Clinic of Drs. Groover, Christie and Merritt.

Roentgen therapy is termed superficial or deep, depending upon voltages and filters. At 135,000 volts or less it is considered superficial; deep therapy indicates voltages in excess of 185,000, when filters of copper, zinc and aluminum are invariably employed. Similarly, with radium, filters are utilized to screen out wave lengths as indicated in varying conditions.

Reactions Following Roentgen Therapy

The reactions which follow roentgen treatments are local and general. The local effect varies from barely perceptible erythema to an intense fiery red color of the skin associated with vesication, desquamation, swelling, pain and liquefaction of the subcutaneous structures. Such violent reactions are, of course, indicated only in the treatment of relatively small, superficial malignant growths. It must be noted that intentional reactions of this sort are not to be confused or compared with the intense erythema and vesication which occur when treatments are administered with very high voltage through heavy filters; the local effects are pronounced but healing is prompt.

Systemic reactions vary with the individual, the disease, the intensity of treatment and the area treated. Radiation over the solar plexus will almost always produce nausea, vomiting and a mild degree of shock, while a similar treatment over an extremity will frequently produce no reaction whatever. Probably half of the patients with malignant disease will not have reactions to heavy treatments and the remainder will have reactions varying from a metallic taste or a mild nausea to vomiting, anorexia, and occasionally diarrhea for several days. These symptoms may be controlled in certain cases by carbonated water, iced gingerale, and a diet restricted to fruit juices. Irradiation in diseases of the skin and other conditions requiring less intense dosage will rarely produce radiation sickness.

Diseases Influenced by Radiation Therapy

The following diseases respond, as a rule, favorably to either roentgen or radium therapy, or to both:

Acne Vulgaris and Comedo: These affections of the skin are frequently cured by one treatment; the usual duration of treatment is 6 weeks to 4 months. In many instances no other treatment is required.

Actinomycosis: Roentgen therapy cures in a high percentage of cases; the duration of treatment is 2 to 6 months. The administration of potassium iodid in 1 to 2 dram doses per day is of value as an adjuvant. Fluctuating abscesses should be incised.

Angina Pectoris: Roentgen therapy over the cervical ganglia and precordium is frequently of striking benefit. Instances are reported in which the pain is relieved while the treatment is being given.

Arthritis Deformans: Roentgen therapy is to be considered as an adjuvant to other treatment to relieve the pain in swollen joints.

Arthritis, Gonorrheal: Uniformly good results are reported following the treatment of the affected joint or joints with deep roentgen therapy; the swelling diminishes rapidly and the pain leaves almost immediately.

Asthma, Bronchial: Roentgen therapy is of considerable value in the relief of acute attacks. In those cases in which the asthmatic condition is dependent upon pressure from hypertrophied peribronchial glands or bronchitis a cure may be expected.

Angina, Agranulocytic: Roentgen therapy apparently exerts a specific action in bringing about a very rapid increase in polynuclear leukocytes. Stimulating doses are given over the long bones at daily intervals. The curative value of roentgen therapy, however, has not been proved.

Adenitis: Roentgen therapy may be expected to influence favorably adenopathies regardless of the cause, unless it be luetic. The results are excellent in tuberculous adenitis if the case is seen early; and even when seen late,

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after there is extensive fibrosis in and about the glands, the results are usually good. In cases of adenitis resulting from acute infections, more especially of the head and neck, the prompt resorption of the diseased glands is the rule; occasionally there is very rapid breaking down of the glands, and then they should be incised.

If tuberculous glands show evidence of fluctuation after roentgen therapy they should be aspirated, and this aspiration should be repeated from time to time until all of the material is removed. This method should supplant the usual incision because by this means tuberculous sinuses are prevented.

Bubo: Roentgen therapy is of value in cases of venereal origin where the lymphatics have not already liquefied; resorption or liquefaction is markedly accelerated.

Carbuncles: As a rule, roentgen therapy is very satisfactory in relieving pain. Abscess formation is accelerated and the usual protracted course of the disease is very much reduced.

Carcinoma: Roentgen and radium therapy are practically the only agents capable of producing favorable results in inoperable cases. In early cases the pre- and post-operative treatments are of great value. In *mammary carcinoma* the growth may entirely disappear by the time the patient is ready for operation, which should not be until three weeks following the last roentgen treatment. In advanced forms, where there is extensive malignant nodulation of the skin or metastasis to the bones, suffering is relieved and life prolonged, in many instances for years.

This form of therapy, combined with the interstitial use of radium needles or radon seeds, is responsible for the most satisfactory results yet obtained in this disease.

Carcinoma of the cervix is certainly as efficiently treated by radium and roentgen therapy as by surgery, in addition to which fact one can be assured that there will be no mortality and that the advanced case will not be made worse. The consensus of opinion from all clinics in this country and abroad strongly favors the use of radium and roentgen therapy in all types and in all stages of the disease.

Carcinoma of the Tongue. Deep roentgen therapy supplanted by the use of radon seeds or radium needles interstitially represents the best form of therapy available; the prognosis is much more favorable if the cervical lymphatics are not involved.

Carcinoma of the Larynx. Cures have been reported following deep roentgen therapy alone, as in this disease the malignancy is generally of a less virulent type; radium packs may be used to supplant the roentgen therapy.

Carcinoma of the Lung. Treatment is given by means of radon seeds inserted into the growth through a bronchoscope, supplanted by deep roentgen therapy in advanced cases. Some apparent cures have been reported, but the diagnosis was uncertain.

Carcinoma of the Stomach. Striking improvement has followed deep roentgen therapy in inoperable cases, but no permanent cures have been reported.

Carcinoma of the Colon. If the growth is early, the colon should be resected; if late, the use of deep roentgen therapy, plus the interstitial use of radium, has affected apparent cures. Certain cases of carcinoma of the rectum may be successfully treated by the interstitial use of radium, plus deep roentgen therapy.

Cerebral Tumors: Deep roentgen therapy has prolonged the life of the patient in many instances in cases of glioma, sarcoma, and tumors of the pituitary when surgery is impossible or contraindicated.

Chilblains: Prompt relief of pain is the rule after superficial roentgen therapy.

Corns: Superficial radium-plaque treatments result in cure in 95 per cent of the cases in 3 to 6 weeks.

Condylomata Acuminata: Superficial roentgen therapy cures almost without exception.

Eczema: Subacute and chronic cases respond as a rule to superficial roentgen therapy; success should attend carefully regulated treatments. It is especially valuable in eczema of infants.

Erysipelas: A very prompt response to frac-

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tional doses of roentgen therapy is the rule. The intense red discoloration fades quickly, and pain, swelling and temperature should diminish in the first 24 hours.

EPITHELIOMA: If the lesion is early a single destructive application of roentgen therapy will cure; radium packs, radium needles, or radon seeds are equivalent in action. As a general rule, it is best to subject the adjacent lymphatic glands to intensive doses of roentgen therapy.

FIBROIDS, UTERINE: Roentgen therapy is successful in destroying the generative elements of the ovary without damage to the interstitial tissue, and in addition, but to a lesser degree, effects the tumor cells themselves. The results are nearly always satisfactory if the diagnosis is correct and the contra-indications are avoided. Hemorrhage will rarely have to be controlled immediately after or during treatments by the usual methods. The size of the tumor does not determine the treatment. Contraindications include young women whose conceptive capacity can be retained by the surgical enucleation of a nodular tumor. Pedunculated fibroids and fibroids in which one suspects necrosis or incarceration are not suitable for irradiation.

FURUNCULOSIS: Where suppuration has not already occurred it will rapidly follow roentgen therapy, or there will be a gradual disappearance of the inflammatory zone; the relief of pain occurs in either event.

HEMANGIOMA: The dermal or subdermal hemangiomas, particularly the nevus vasculosus and angioma cavernosum, are successfully treated with radium, and in most cases it is the method of choice. In most instances these lesions are visible at or shortly after birth, and treatment should be begun during the first year of life. Many cases can be successfully treated by surface applications of radium, but in a few, because of location or other circumstances, it may be necessary to use it interstitially. Treatment should not be intensive and two or three months should intervene between surface applications, the idea being to produce a gradual and slow tissue change. The entire period of treatment in many cases will require more than a year. Radiation therapy of nevus flammeus, or port wine mark, is not very satisfactory.

HODGKIN'S DISEASE: There is no cure. Roentgen therapy is the best and practically the only measure that affords palliation. It causes a speedy regression and disappearance of the glandular masses. Pressure symptoms are relieved and the general well-being of the patient can be maintained often for many months, thus enabling him to lead an active life until near the inevitably fatal termination. Treatment is more effective in the chronic than in the acute type of the disease.

HYPERIDROSIS: Excessive sweating of the hands, feet or axillae respond well to roentgen therapy. Three or four treatments usually suffice to satisfactorily ameliorate the condition.

HYPERTHYROIDISM: Roentgen therapy combined with proper general management gives satisfactory results in from eighty to ninety per cent of all cases of hyperthyroidism regardless of the type. Of the remainder more or less improvement is obtained in the majority of cases. The number of treatments required to effect a cure varies with the individual case, but 6 or 7 is the average number. Treatments are ordinarily given at intervals of three weeks and the average duration of time patients are under treatment is from 4 to 5 months. Recurrences are rare and when they occur indicate insufficient treatment. Sequelae are also rare. Hypothyroidism occasionally supervenes. Telangiectases or other skin changes rarely occur with present-day methods.

KELOID: Radiation is the best method of treatment. X-ray is the preferable agent in most cases. The maximum improvement is not obtained for six months or longer from the time treatment is begun. The prolonged shrinkage of the hyperplastic tissue resembles the shrinkage which occurs in uterine fibroids treated by radiation. It continues for a long time, even for months after treatment may have been discontinued. It is not advisable to try to hasten a cure by pushing the treatment. The final result usually obtained is a pale, smooth, flat, pliable, painless scar. In a few carefully selected cases a better cosmetic result may be obtained by excising the keloid, neatly suturing the wound, and then using roentgen therapy to prevent a recurrence.

KERATOSES: Such lesions, particularly if they show evidence of irritation or degeneration, should be destroyed either by roentgen therapy or electrodesiccation. One treatment by either method is curative.

LEUKEMIA: The results of roentgen therapy closely parallel those obtained in Hodgkin's disease, q.v. While it is in no sense curative it is the only palliative measure worthy of serious consideration. Initially, treatment causes marked reduction of the splenic enlargement and leukocytosis with coincident improvement in the well-being of the patient which can be maintained for a variable length of time. Ultimately a stage is reached when a favorable response to treatment no longer occurs, and the disease proceeds to a fatal termination.

LUPUS: Small areas of lupus vulgaris are sometimes cured promptly and permanently by roentgen therapy, but in general recurrences are common. Roentgen therapy for repeated recurrences should not be unduly persistent. In such cases ultraviolet light is preferable. In lupus erythematosus radiation therapy is not very satisfactory.

LYMPHOSARCOMA: Roentgen therapy causes the tumor masses to rapidly disappear just as it does in other diseases of the malignant lymphoma group. Although it rarely if ever cures the disease it keeps it under control and enables the patient to lead an active life often for many months or years.

MASTITIS: Mastitis, as any infectious condition, may be either acute or chronic. The acute type is sudden in onset and presents the symptomatology attendant upon a similar condition elsewhere in the body. Roentgen irradiation acts here, as in other infections, to either hasten resolution or facilitate suppuration. The result from this mode of treatment is quickly attained, thereby saving the patient the hazard of a blood-stream infection and the disability of a prolonged illness. One of the objectionable features of this condition is the extreme pain the patients suffer, which is not always easily abated by morphia. If for nothing other than the relief of pain, roentgen therapy more than justifies its use.

Chronic mastitis also responds admirably, although the result is not obtained as rapidly as in the acute form.

Only fractional doses of roentgen therapy of moderate wave-length are required, and in good hands this method precludes any deleterious effect.

MENOPAUSAL SYMPTOMS: The symptoms attendant upon either a normal or an artificial menopause are frequently very disagreeable and often incapacitate the individual for a varying period of time. With this in mind many investigators have worked diligently in an effort to bring relief to this type of patient. Satisfactory results are now being obtained by fractional doses (10 per cent) of deep roentgen therapy over the pituitary gland, a fact which is well worth keeping in mind.

MENSTRUAL DISORDERS: Under this heading are included irregularities of menstruation not associated with uterine fibroids, or with benign or malignant tumors of the cervix or uterus. They may then be briefly classified under the headings "amenorrhea" and "menorrhagia."

(*a*) *Amenorrhea:* Amenorrhea due to ovarian or other glandular hypofunction can be relieved in more than 50 per cent of the cases by roentgen therapy. One-tenth of a sterilizing dose is all that is required over the ovaries, supplemented by fractional doses over the pituitary gland in appropriate cases. Menstruation usually occurs within six to eight weeks and is often permanently restored. A number of pregnancies have occurred after prolonged periods of previous sterility.

(*b*) *Menorrhagia:* Having excluded the obstetrical causes and the benign and malignant tumors of the cervix and uterus, uterine bleeding is most frequently the result of hypertrophic endometritis or idiopathic causes. Radiant energy is specific for this class of cases and is accepted by the leading surgeons, gynecologists and radiologists as the treatment "par excellence."

For proper treatment these patients should be subdivided as follows: (1) those in which it is desired to restore normal menstruation, usually women under 40 years of age, and (2) those in which a permanent cessation of menstruation is desired. This latter group consists of women near or past the menopause or those in which for one reason or another the establishment of permanent sterility is advisable. For the first group the administration of a fractional dose of radium intra-uterine gives excellent results. In patients in which menopause is sought the results are equally good from either radium or roentgen therapy. The method of choice depends on the individual case.

In no field of therapeutics have more successful results been obtained than from radiant energy in cases of uterine bleeding. There are no contraindications to this form of therapy.

MIXED TUMORS OF THE PAROTID GLAND: All non-encapsulated and all recurrent, mixed tumors of the parotid and other salivary glands should be treated by radiant energy. The interstitial implantation of radium is the method of choice. It is advisable in some cases to supplement the radium with high voltage roentgen therapy. The results obtained from radium and roentgen therapy in the small encapsulated growths of this nature compare favorably with those from other methods.

MULTIPLE MYELOMA: The only hope for relief in this condition is from either deep roentgen therapy or the surface application of radium. The results in many cases far exceed the fondest expectations, and some patients live comfortably for a period of years. The latest evidence is that there may be an associated dysfunction of the parathyroids; therapy is now being used with this in mind and the results so far are very encouraging.

MYCOSIS FUNGOIDES: Roentgen therapy is the most successful form of treatment in this disease. Good results are usually quickly obtained even though there is rather extensive involvement.

OSTEITIS FIBROSA CYSTICA: Roentgen therapy often produces complete bone regeneration in these lesions and should be tried in all cases of this disease. The associated pain is completely controlled in this manner. Recent investigations show that parathyroid dysfunction is probably an etiological factor, and bone regeneration is unquestionably hastened by including the parathyroid areas in the field of therapy.

OSTEOMYELITIS: Radiant energy is not advocated in cases of acute osteomyelitis, nor is it a "cure all" in the chronic cases. It is in selected cases, however, a very valuable adjunct to surgical treatment. Its action here is the same as in other infections, that is, it hastens localization and suppuration and in this way shortens the period of disability. This is particularly true in cases in which more than one bone or joint are involved, such as the tarsus or carpus. The concomitant pain is simultaneously controlled, and this alone justifies the method.

PAGET'S DISEASE: This condition is apparently produced, in part at least, by a dysfunction of the parathyroid glands. Recent results obtained following fractional roentgen therapy over the parathyroids substantiate this theory, since regression in the excess bone production results and there is also a definite diminution in the size of the bones. This fact is worthy of consideration since no other method offers any permanent improvement. Pain is a frequent disagreeable symptom and this is controlled by the therapy.

PAIN: Radiant energy, as an analgesic agent, has no superior in either the degree of efficiency, the duration of effect, or the broad field of applicability. It constitutes a safe, rapid and efficient therapeutic procedure, does not preclude other forms of therapy indicated, and has no deleterious effects. In the majority of cases only fractional doses are required and no unpleasant effects result.

Space does not permit a detailed description of the individual lesions in which marked and prompt relief may be expected, and only the most important ones are hereby enumerated:

primary and metastatic carcinoma, primary and metastatic sarcoma, angina pectoris, infections of all types, neuralgia, neuritis, Paget's disease, coccycodynia, myalgia and various post-operative conditions.

PARATHYROID DYSCRASIAS: It has been definitely proven that the parathyroid function is intimately related to calcium and phosphorus metabolism and that it plays an important rôle in many conditions, such as Paget's disease (osteitis deformans) and the various bone lesions in which there is a fibrocystic degeneration.

In cases in which there is an increase in bone production, as in Paget's disease, there is usually a hypofunction of the parathyroids. This responds to fractional doses of roentgen therapy and is followed by a definite improvement in both the size and texture of the bone.

Hyperfunction produces a cystic degeneration in bone. An adenoma of one or more of the parathyroid bodies is sometimes found in these cases. Roentgen therapy offers the most efficient method of controlling this condition, and it is not at all unusual to have complete bone regeneration within a few weeks following therapy, even when there has been an extensive involvement.

PARONYCHIA: Roentgen therapy is a valuable adjunct to other methods in the treatment of this condition, although the results are not obtained as rapidly as in some of the other infections.

PAROTITIS: The result from surface application of radium is very satisfactory in both the primary and secondary cases. Rankin of the Mayo Clinic is very enthusiastic about its effectiveness in cases secondary to operations of the colon.

PERTUSSIS: Roentgen therapy decreases the paroxysms and shortens the duration of confinement in many of these cases. The results are especially good in the presence of lymphocytosis.

PHLEBITIS: The pain in this condition responds quickly to roentgen therapy, and the induration and swelling are greatly improved.

PROSTATIC HYPERTROPHY: A fair number of these people are poor physical risks and radical operative methods are contraindicated. To this group roentgen therapy is a very valuable therapeutic agent, since it will definitely decrease the size of the gland and in some cases completely relieve the condition.

PRURITUS: All cases of this nature are grouped under this one heading since the results are uniformly good. This is especially true in the cases of pruritus ani and vulvae. Only fractional doses of x-ray are necessary and marked relief is usually afforded in a very short period of time. Many patients remain well for months and some are permanently cured. The recurrences are as easily controlled.

PSORIASIS: This is a most chronic condition and nothing offers permanent relief. Roentgen therapy, however, improves the condition more than any other therapeutic measure and by its judicious use enables many individuals to carry on in a normal manner.

PURPURA HEMORRHAGICA: The results from roentgen therapy in this condition are very gratifying. Following treatment the majority of these individuals are restored to normal health, and those in whom a permanent cure is not obtained are enabled to live a relatively normal life. It is often a life-saving procedure.

RINGWORM: Radiant energy is practically specific for this condition. This is especially true when there is involvement of the scalp. An epilating dose of roentgen therapy will cure these individuals and is certainly the method of choice.

SINUSES AND FISTULAE: There is nothing more chronic than an old draining sinus, and any therapeutic measure that will produce results is more than graciously received by all branches of the profession. Roentgen therapy plays an important rôle in the treatment of these conditions and the results are uniformly good.

SPLENOMEGALY (BANTI'S DISEASE): The spleen, being lymphatic in nature, responds very rapidly to all forms of radiant energy. By means of roentgen therapy or by the surface application of radium the spleen may be entirely destroyed, thereby obviating more radical procedures.

Thymic Enlargement: The danger of administering a general anesthetic to any child with an enlargement of the thymus is well known to the medical profession, and in many of the larger children's hospitals it is the routine to have a roentgenogram of the chest in every case as a preoperative measure. The results from roentgen treatment in these cases are uniformly good and radiation the only mode of attack.

Tonsillar Hypertrophy and Chronic Tonsillitis: The tonsils, being lymphoid in nature, respond readily to radiant energy in the form of interstitial implants of radium or by the surface application of radium or x-ray. This is important to bear in mind in cases in which, for one reason or another, surgical measures are contraindicated.

Tuberculous Peritonitis: This condition is greatly benefited by any form of light, and fractional doses of roentgen therapy produce marked improvement in many cases and an apparent cure in some.

Unresolved Pneumonia: The results from roentgen therapy in these cases are prompt with no untoward effects. The treatment is of brief duration, entailing no strain nor discomfort to the patient; it appears to be a distinct addition to the meagre and unsatisfactory methods in common use. The suggestion is offered that irradiation should be instituted in all cases showing definite roentgen signs of delayed resolution three weeks after onset.

Verrucae and Plantar Callosities: This group comprises three distinct lesions: the verrucae or simple warts, the verrucae plantaris or plantar warts, and the callosities or corns. They will be considered together since the facts involved are practically the same. Approximately 90 per cent of these lesions are cured by one or more treatments, either by surface application of radium or by x-ray, depending on the type and location of the lesion.

Xanthomatosis: This is a disease of lipoid metabolism in which tumors of lipoid material appear in various parts of the body. The general health is usually affected. The only form of treatment that is at all effective is roentgen therapy directly over the tumors. Uniformly good results are thus obtained and the patients usually live for years following treatment..

MEDICAL AND DENTAL RELATIONS*

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The most important phase in both dentistry and medicine is diagnosis; it forms the basis of prognosis and treatment. A good result may be accomplished by many forms of treatment and different surgical methods, but there can be only one true diagnosis. For success in oral diagnosis, one should possess a knowledge of all of the diagnostic methods, and a clinical knowledge, based upon actual experience, of all of the diseases of the mouth. A diagnosis to be thorough should be conducted in a routine manner, and the results recorded on some suitable form. Advantage should be taken of all the diagnostic methods, such as roentgenography, transillumination, electric pulp test, palpation, temperature tests, general oral examination, laboratory tests, and general physical examination. These should form the basis of a differential diagnosis. A correct diagnosis cannot usually be made by the use of any one method, but it requires a consideration of all methods. Subjective symptoms are very important and should not be underrated. The patient's part in the diagnosis is not always an insignificant one. In many cases all of these methods will fail to show pathologic changes, but an exploratory operation based upon subjective symptoms will reveal definite disturbance.

There is still a wide variation of opinion among the rank and file of the dental profession regarding the pulpless tooth. From a casual survey of many physicians' mouths it would seem that they, too, have their doubts regarding the danger of retaining non-vital teeth. However, I believe that recent researches and long clinical observation have shown that most non-vital teeth (the so-called dead teeth) are a menace to good health. Some men feel that in many cases pulpless teeth may be safely retained, providing the patient's systemic condition warrants such preservation. On the other hand, we must never lose sight of the fact that there is a great difference between a sick person and a healthy person. Where it may be advisable to leave a non-vital tooth in the mouth of a person in apparent good health, it may be very disastrous to do so with a patient in poor health. Especially is this true in one suffering from a disease, the origin of which is traceable to focal infection.

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* Read before the Society, November 25, 1931.

Another very important consideration is the coöperation between the physician and the dentist. In almost every instance this reacts to the benefit not only of the physician and the dentist, but of the patient as well. Intelligent extraction of teeth, eliminating possible foci of infection, and oral surgical operations cannot be practiced without some knowledge of the patient's physical condition and peculiarities. Even an apparently simple extraction may result disastrously for the patient in the presence of such diseases as angina pectoris, diabetes mellitus, hemophilia, leucemia, Vincent's angina, acute infections of all kinds, and other systemic disturbances, unless an effort is first made to control the disease before operation. Preoperative treatment, time of operation, amount of surgery feasible at one time, and care of the patient, are to be determined by the close cooperation of the physician and the dentist. It would be ideal if it were possible to have a complete physical examination for each dental patient, together with the routine laboratory tests and any special tests indicated.

Because most physicians consider a physical examination incomplete until the patient has had a dental examination perhaps the physician should know what procedure a dentist goes through before arriving at a dental diagnosis. All too often the report which the dentist makes to the physician is vague and unsatisfactory in that it does not explain thoroughly the reasons for certain conclusions. Many times there are no conclusions, and what is worse, there are no recommendations that the physician can give to the patient.

Most reports which accompany dental radiograms are not true dental diagnosis, but rather radiographic readings. The difference between the reading of a dental radiogram and the dental diagnosis can be compared to the difference that exists between a laboratory report and the physician's impression after a complete study of his patient.

"In oral diagnosis the radiogram is a valuable diagnostic aid when used as an adjunct to other clinical findings. There is no other single factor which will give so much valuable information. When used to supplement other methods of examination, radiograms are indispensable in most cases; but when considered without other clinical factors and findings, they are practically useless."* The dental radiogram can be very deceptive at times if taken at its face value. "While oral diagnosis is essentially a discrimination between diseases of the mouth, there is an intimate association between local diseases of the mouth and diseases of adjacent parts and general systemic disturbances."

"To accomplish the purpose of maintaining and preserving the general health of the patient, it becomes more and more necessary for dentists to have a thorough knowledge of general systemic conditions and also to include within an oral diagnosis certain phases of general diagnosis. This should not mean, however, an invasion of other fields or an attempt to diagnose general disturbances as associated with the teeth."†

In the beginning, it was thought that ten intraoral films were enough to show any pathologic change that might exist in the mouth. But later, as the value of views taken from different angles became apparent, it was deemed advisable to increase the number of exposures to fourteen or fifteen. This number allows two views of almost every tooth from two different angles. Some men go even further and insist on sixteen, eighteen or twenty-two views. Of course, this thing can go on and on, and as it does the whole procedure becomes more expensive for the patient. A halt must be called somewhere, and it has become the accepted standard in most dental centers to use either fourteen or fifteen window mounts for the average case in the routine examination and to supplement this when necessary with additional views of the particular type and part indicated.

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* Mead, S. V., Diseases of the Mouth, C. V. Mosby & Co., page 31.

† Mead, S. V., Diseases of the Mouth, C. V. Mosby & Co., page 17.

Because the mouth is an important index of systemic conditions, the dentist and the physician are more and more working together to keep the patient in good health. The more the members of one profession understand and appreciate the problems of the other, the better this ideal can be achieved.

PRIMARY CARCINOMA OF THE LUNG WITH CEREBRAL METASTASES*

Report of Four Cases

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The marked increase in primary carcinoma of the lung has been widely commented upon during the last few years. This increase is by no means due to the more effective study of pulmonary conditions by roentgenologists, since pathologists have also remarked upon the large number of cases submitted to necropsy. The cause of the increase is not definitely known, but the increasing pollution of the atmosphere by irritant substances, especially burned oils, may be a factor.

The "epidemic" has recently become manifest at St. Elizabeths Hospital where four cases have come to necropsy within a little more than a year, although previous to that time there had been only one case recognized in 5,600 necropsies.

Primary carcinoma of the lung is rather apt to show itself indirectly by involving other organs, and the first symptoms of which the patient may complain are often due to metastases. This is indeed so common that metastases in unusual places should be seized upon as a signal to review the examination of the chest in the hope of discovering the primary lesion. The reason for such unusual metastases is that the cancer emboli are spread through the arterial system and do not have to pass through such filters as the liver or lungs before becoming disseminated. It is also of interest that the metastatic lesions may grow to larger size than the primary tumor itself and cause far greater disability.

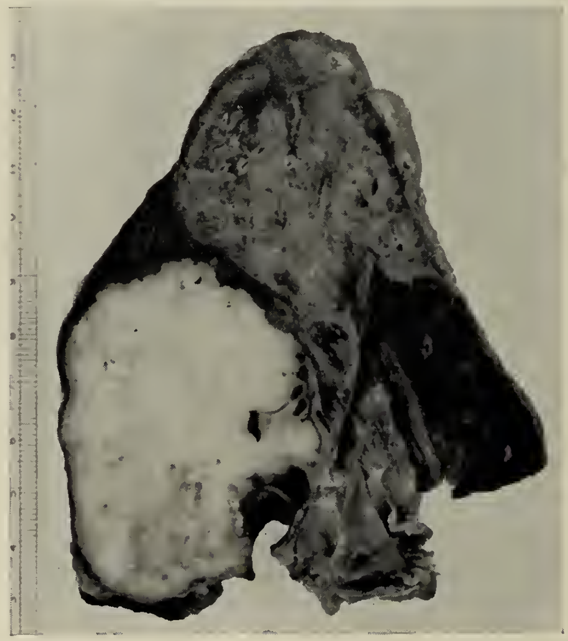

Fig. 1. Case 2. Primary Carcinoma of Lung Producing Bronchial Obstruction with Pulmonary Suppuration

The brain is very frequently the site of metastatic lesions in cases of primary carcinoma of the lung, so much so that in more than one clinic it is the custom to examine the chest radiographically before exploring the cranium for a suspected tumor. Not only do lesions occur in the brain but they may grow to considerable size before other metastatic lesions become evident. In cases of slowly growing tumors there may be neurological signs for many months before death, and vascular rather than neoplastic damage may be suspected. The tumors are usually multiple, and it is fairly common to have one of much larger size than the others. In certain cases only one metastatic tumor is found even upon careful sectioning, but the microscope may reveal many minute lesions widely scattered through the brain. The site of election seems to be the cortex, although some may be found in the deeper parts, especially of the gray nuclei. The cerebellum is less frequently involved.

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* Read before the Society January 27, 1932.

The neurological symptoms and signs produced by the tumors metastasizing from the lung are dependent upon the location of the growth or growths and upon the rapidity of their development. In this respect there is no difference between a tumor metastasizing from the lung and one that comes to the brain indirectly. In probably more than half of the cases the tumors are latent and are discovered only at necropsy. Even when symptoms or signs are present, their interpretation may be faulty. However, if a patient presents neurological signs and is known to have a primary carcinoma of the lung, it is logical to conclude that metastasis has occurred, even though the symptoms may antedate the recognition of the pulmonary condition by many months and may apparently be stationary. A further difficulty is presented in our cases by the occurrence of symptoms apparently unrelated to the neoplastic condition. In one patient, for instance, epilepsy had been present since childhood, while in another there was a well developed paralysis agitans that had its origin in degeneration of the substantia nigra. The other two patients were psychotic but had definite focal symptoms that proved to be due to metastatic tumors primary in the lung. Interesting articles relative to the subject under discussion have recently appeared (Parker,

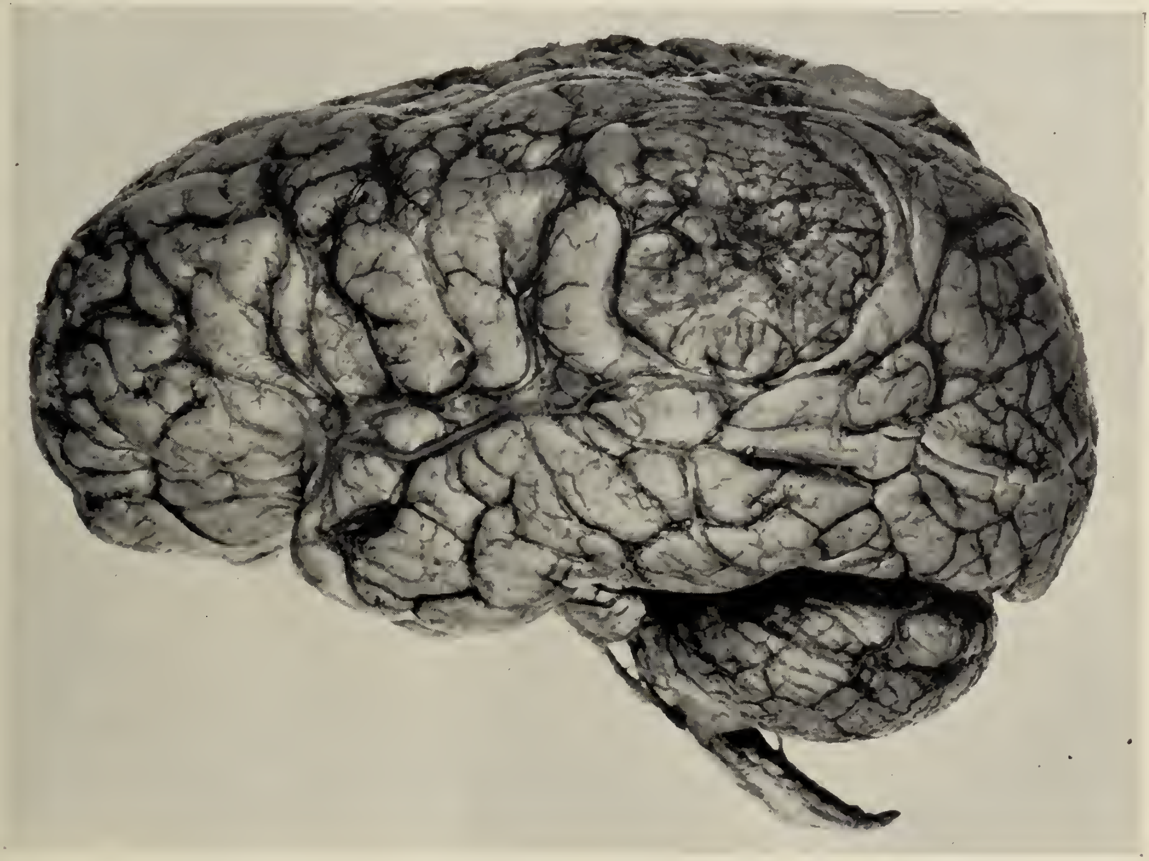

Fig. 2. Case 4. Large Metastatic Lesion in Supramarginal Gyrus
Many other smaller lesions seen on section

Klotz, Simpson, Junghans, Hall and Harding, Fried and Buckley).

Case Reports

Case 1. White male, aged 65, admitted May 3, 1930, died September 5, 1930. Diagnoses: Abscess of upper lobe right lung, paralysis agitans, psychosis with cerebral arteriosclerosis. He was quite feeble, tremulous, complained of pain in the abdomen after meals. No mass was palpable, but hydrochloric acid was absent from the gastric secretion. The blood pressure was 190/110 and the peripheral arteries were sclerosed, but the heart was not enlarged and the urine was negative. Neurologic examination revealed the typical gait and attitude of parkinsonism. The right eye was blind from an old injury and diverged somewhat. There was a pill-rolling tremor of the fingers, more marked on the right side, with coincident signs and active reflexes. The lower limbs were even more markedly affected, with ankle clonus on the right. The Babinski sign was negative. There was marked emphysema that seemed to displace the heart to the right, but no other abnormalities were noted on examination and the sputum was negative for tubercle bacilli. X-ray of the chest disclosed a round shadow the size of a golf ball in the upper lobe of the right lung. It was considered to be a benign cyst. On September 1, the temperature became elevated together with the pulse and respiration. Mucopurulent material streaked with blood was expectorated freely. The shadow had increased in size to that of the fist. It was very dense and was then supposed to be an abscess. Death occurred four days later.

Necropsy disclosed a new growth arising from the axillary portion of the upper lobe about 12 cm. in diameter and extending 8 cm. into the pulmonary tissue. The interior was markedly necrotic and hemorrhagic with a ragged cavity partly filled with blood. The lower part of the upper lobe was the seat of hemorrhagic infarction, the upper was consolidated and full of small ragged cavities which contained necrotic material of foul odor swarming with Vincent's organisms. A branch of the pulmonary vein was compressed and thrombosed. Metastatic lesions were found in the heart muscle (reported by Yater) in the liver, and in the brain. Frontal section through the pulvinar revealed a hemorrhagic mass between the gyrus callosomarginalis and the body of the ventricle on the right side measuring about 25 mm. in diameter. It was somewhat trabeculated and showed microscopically the same structure as the pulmonary tumor. The cells were variable in size and shape, mostly fusiform with medium sized nuclei containing a moderate amount of chromatin. Small cells were frequent, but very large cells with grotesque nuclei often multiple were disclosed. The origin of the carcinoma was considered to be alveolar rather than bronchial. In addition to the metastatic lesion of the brain there was marked degeneration of the substantia nigra with many phagocytic cells filled with pigment and some inflammatory perivascular infiltration.

The varied findings in the lung were apparently due to obstruction of a bronchus leading to collapse and secondary infection, and to obstruction of a pulmonary vein resulting in thrombosis and hemorrhagic infarction. The sputum was probably due to the breaking down of the infected pulmonary tissue rather than to actual bronchial erosion by the tumor. The tumor in the brain probably gave rise to no symptoms, since it was small and in a silent area. Moreover, the well marked nervous disease would have obscured any positive findings.

Case 2. White male, aged 43, admitted March 29, 1930, died January 24, 1931. Diagnoses: Primary carcinoma of lung with metastasis, epilepsy. The patient had had convulsions in infancy and was definitely epileptic at the age of 13. His mental age was under 9 years. The seizures were typically grand mal in type and he injured himself frequently. Aside from hyperactive knee-jerks, the general physical examination was negative. On November 26, 1930, he was found to have a painful swelling with bluish discoloration about the size of a hen's egg in the upper third of the left tibia. Aspiration did not yield pus and a culture was sterile; biopsy revealed metastatic carcinoma. Steps were immediately taken to find the primary growth. The prostate was normal. The gastrointestinal tract was found negative by X-ray. The roentgenologist reported: "There is definite pathology in the left upper lobe with thickening of the pleura. In view of the history in this case and other coincident pathology, this is probably the area of carcinoma." The blood count and urinalysis revealed nothing further. The biopsy wound healed very slowly with exuberant granulations. On December 24th the patient suddenly went into collapse with cyanosis and rapid pulse. Death resulted within an hour.

The left lung was the seat of a tumor mass about 8 x 6 cm. centering about the bronchus supplying the upper lobe and compressing the pulmonary artery on this side so that scissors could not be forced through it. The bronchus was completely occluded, and the neighboring branch to the lower lobe was also invaded. Upon section the mass was lobulated, pale, somewhat translucent, sharply outlined, but tending to spread along the bronchial tree. Areas of necrosis were present, from which caseous material could be expressed. The apex was consolidated, grayish, containing many cavities that were recognized to be bronchiectases filled with mucoid secretion. The growth had metastasized to the tibia, ribs and brain. The lesion in the brain was far posterior in the left first temporal convolution and measured only about 15 mm. in diameter. It occupied the cortex and to a slight extent the underlying white matter, and was accompanied by some softening. Another nodule, only 4 mm. in diameter, occupied the cortex of the occipital lobe. Several old softenings were found in various parts of the brain. Microscopically the main growth as well as the metastases consisted of large polygonal cells with vesicular nuclei and prominent nucleoli. Mitotic figures were plentiful and syncytial forms occasional. Arrangement in dense masses as well as in papillary formation was common. The stroma was deficient and tended to become hyalinized. Necrosis was not very marked. The growth almost completely occluded the bronchus in one section. The apex was the seat of advanced interstitial pneumonitis of suppurative type with widely dilated bronchioles filled with leucocytes. Round cells predominated in the compressed alveoli. Microscopic examination of the brain revealed large numbers of minute metastatic lesions in the cerebral cortex.

The cause of death remained obscure in this case although it was considered possible that the pulmonary circulation had become disturbed through compression of the main artery. No definite convulsion was noted. The cerebral metastases in this case remained latent.

Case 3. White male, aged 57, admitted July 2, 1930, died March 7, 1931. Diagnoses: Carcinoma of stomach, metastases to skeleton, psychosis with organic brain disease, cerebral thrombosis. In July, 1927, the patient had a peculiar attack in which he became unable to read. He had to give up his occupation of printer. He did not improve, and in July 1929 had a "stroke," became incontinent, and had periodic epileptiform seizures. He was bed-ridden for many months before admission. He appeared to be disoriented, answered in monotonous, halting fashion, not always relevantly, and appeared greatly confused. He was anemic and emaciated. There was poor expansion of the chest with impairment at the left base anteriorly and diminished breath sounds posteriorly. Breath sounds were increased at the right fourth rib anteriorly and over the right scapular region posteriorly. Later examination contradicted these findings. There was a very firm enlargement above the right knee with pain on movement but no reddening. The sternal end of the right clavicle was the seat of a firm smooth mass 7 cm. in diameter. Neurologic examination revealed aphasia. The patient became lost when trying to recount his symptoms and showed no appreciation of statements made to him. He called objects by wrong names and appeared not to understand their use. The eye-grounds showed a little overfilling of the veins. Upon movement of the pelvis the patient complained bitterly of pain in the sciatic distribution. The reflexes were very active. Urinalysis was negative, the blood count revealed hemoglobin 52 per cent, R.B.C. 2,700,000; W.B.C. 9,800. The Wassermann reaction was negative. X-ray of the femur disclosed a tumor involving the shaft with complete cortical destruction and much osteogenesis. The spinal fluid was negative. The lower limb was amputated, and the tumor was found to be of carcinomatous type. Further examination revealed nothing in the prostate, but there was a large filling defect in the stomach, which, taken in conjunction with a long history of indigestion as well as persistent nausea, led to the diagnosis of carcinoma of the stomach with metastasis. In October, 1930, the chest was negative for malignancy. In July, 1930, the pelvis was noted to be involved by carcinoma. The focal neurologic signs did not seem to progress, but death was due to a series of convulsive seizures with rapid circulatory failure.

Necropsy: Near the apex of the left lower lobe lying close to the vertebral column was a firm whitish mass about 5 x 4 cm. in diameter, covered over with pulmonary tissue the surface of which showed a puckered, radiating scar. One of the bronchial branches ended directly in this mass. The growth was sharply circumscribed but not encapsulated, firm, whitish, somewhat lobulated. From this main mass there were a few small conglomerate extensions. The mass was surrounded by firm anthracotic pulmonary tissue, and there was no indication of bronchial occlusion or of thrombosis. Both lungs were filled with miliary carcinomatous nodules, and other metastases were found in the lymph nodes, spleen, gall bladder, kidney, thyroid, skeleton and brain. In addition there was a hypernephroma of the suprarenal with metastasis to the liver. The pulmonary growth was very highly differentiated and consisted of high columnar epithelium with nuclei at the base, and occasional cilia. The stroma was also highly developed. Papilliferous formations were frequent and mitoses infrequent. The brain was the seat of numerous metastatic lesions; the largest was situated in the temporoparietal region and measured 6 x 4 cm. This was sharply circumscribed and surrounded by compressed cerebral tissue. The cut surface was grayish, translucent, with scattered areas of hemorrhage and of yellowish degenerated tissue. A nodule was also found in the left side of the pons, although the pyramidal tract did not present much degeneration. Histologically the same high degree of differentiation was present in the metastatic lesions that had been observed in the primary growth.

The attack of aphasia that the patient presented in 1927 was undoubtedly occasioned by the location of the metastatic nodule in the left temporal lobe, and the slow intermittent progress was the cause of the error in diagnosis. The other lesions were presumably too small to cause much disturbance, although the tumor in the pons might have contributed to the hemiplegia.

Case 4. Colored male, aged 58, admitted October 10, 1931, died November 27, 1931. Diagnoses: Acute miliary tuberculosis, laryngeal tuberculosis, psychosis with cerebral arteriosclerosis. The onset was in the early part of 1931 with pain over the left eye, becoming so severe in May that he had to stop work. In a few days he noted that the right foot dragged and the hand was weak. There was numbness in the hand, with incoordination. In June he began to talk in a rambling, incoherent manner. He developed ideas of desertion, became untidy, and wept when trying to answer questions. On admission he lay in bed all the time in semi-stupor. He answered questions in a hoarse whisper, mumbling incoherently most of the time. Right hemiplegia was noted, but the Babinski sign was negative. Examination of the chest revealed impairment to percussion over the left upper lobe. The patient would not cooperate in laryngoscopy. X-ray showed extensive involvement of the right lung with "miliary tuberculosis," and rather marked opacity of the left lung, chiefly about the upper lobe. One out of three sputum examinations was reported positive for tubercle bacilli. It was considered that although the patient was in the senile period, the progressive character of the focal signs might indicate development of a tubercle in the brain.

Even at necropsy the distinction between carcinoma and tuberculosis was doubtful. The upper lobe of the left lung was the seat of marked induration that upon section appeared yellowish, not sharply demarcated, and shaded off into the congested pulmonary tissue in the vicinity. The lower lobe of the left side and the entire right lung were full of small nodules of firm, translucent, yellowish character, 1 to 3 mm. Yellowish, purulent secretion could be expressed from the bronchi. There were no cavities. Metastases were present in the lymph nodes, suprarenal medulla and brain. The larynx was entirely normal. The lesions in the brain were very numerous, a dozen being observed on a single plane of section. Most of them were minute nodules embedded in the cortex. In the left parietal lobe there was a nodule superficially placed, measuring about 6 cm. in diameter and extending into the substance of the brain about 4 cm. This was firm, grayish, granular, sharply circumscribed and showed no central softening. Another large nodule occupied the left occipital region. The gray matter of the basal ganglia was affected, and a small nodule was found in the midbrain. Microscopically the lesions were all cancerous, apparently of a rapidly progressive character. The cells were polygonal, with large nuclei and many mitoses, and the source, whether bronchial or alveolar, could not definitely be determined. Tuberculosis was not found.

We were completely mistaken concerning the nature of the process in this patient because of the peculiar roentgenogram of the chest and of the reported finding of tubercle bacilli in the sputum. That a focal process was going on in the brain was suspected.

Conclusions

The frequency of metastasis to the brain in primary carcinoma of the lung should be remembered by the physician under two peculiar circumstances. In the first place, when the symptoms point to a tumor in the brain, the chest should be studied as a possible primary focus; in the second place, when a patient with peculiar thoracic disease presents evidence of cerebral involvement, the malignant nature of the process should be suspected.

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DISCUSSION

Major Paul E. McNabb: "Doctor Freeman has presented in these four cases convincing evidence of the high incidence of metastasis to the brain in cases of primary carcinoma of the lung. Recently I reviewed the pathological findings at autopsy in 43 cases of primary lung carcinoma which we have in the Army Medical Museum. In the 14 cases in which a complete necropsy was made, six had cerebral metastases."

Dr. John Minor: "Doctor Freeman has presented a very interesting clinical condition. In 1925 I had three cases, in one of which the symptoms were primarily neurological. I searched the literature at that time, and I was impressed with the frequency of cerebral metastases. The only trouble with it is while it is interesting from a diagnostic standpoint, from the therapeutic standpoint it is hopeless. I would be interested to know if these cases of Doctor Freeman's were proven primary growths of the lung?"

Dr. David Davis: "All cases of carcinoma of the lung show some pulmonary symptoms or signs if careful enough history and examinations are made. If the physicians in charge of such cases would try to determine the etiology of the cough or the expectoration of blood-tinged sputum, etc., by definite diagnostic methods, such as the X-ray or by the bronchoscope, early diagnosis would be made in almost every case. Most pulmonary carcinomata begin in the bronchi and can be seen through the bronchoscope. In this way treatment could be instituted before metastases have taken place. Obviously when pulmonary carcinomata have metastasized to the brain or any other part of the body, it is too late to institute therapeutic measures. I therefore urge X-ray and bronchoscopic examinations of all pulmonary conditions whose etiology is not absolutely known and in those cases in which they may assist in the treatment."

Further discussion was participated in by **Dr. Wm. Thornwall Davis.**

Dr. Wm. Thornwall Davis: "According to statistics metastases occur in 50 per cent of all cancers; 4 per cent of these occur in the central nervous system. No statistics are available on involvement of the eyes but it occurs probably more frequently than we are aware of. In this connection I would like to mention the case of a young married woman with carcinoma of the breast. The breast was removed on June 6, 1929 by Dr. Charles S. White. I saw her on June 17, 1930 complaining of severe headaches with vomiting. The left optic disc was choked on the nasal half but the temporal half was quite normal. This is a rare condition and has been reported in literature in but three instances from records in the Surgeon General's Library. The probable explanation of the choking of but half the disc is that the cancerous growth extended from the brain along the nasal half of the sheath of the optic nerve into the fundus of the eye.. There was an elevation on the disc of 3 mm. which extended into the fundus some 2 or 3 disc diameters gradually sloping off into the normal fundus level. This, one would take to be an infiltration of the choroid. When there are symptoms present of intracranial involvement one should consider the possibility of cancer metastasis. The brain involvement may occur before the original site of the disease is recognized. Cancer of the prostate, breast and lung is prone to metastasize early."

POSTMORTEM CESAREAN SECTION

REPORT OF A SUCCESSFUL OPERATION*

RAYMOND T. HOLDEN, JR., M.D.

Clinical Professor of Obstetrics, Georgetown University School of Medicine

The occasion may arise in any practice when it becomes necessary to do a postmortem cesarean section. The operation is still being done. In the confusion attending the sudden death of a mother the physician should not neglect the opportunity as well as the duty of attempting to deliver a living unborn child.

Postmortem section is one of the oldest of operations. It is referred to in mythology as the mode of birth of Bacchus and Aesculapius. As far back as the seventh century B.C. the Roman Law required that this procedure be done on every undelivered woman dying near term. To this day the laws of many nations require that the operation be done.

Prior to the present century little success in delivery of a living child was realized from this emergency measure. Later authors have reported success varying from 30 to 65 per cent. Antemortem delivery is now considered in all patients with fatal illnesses in preference to delivery after death, and this no doubt accounts for the fact that postmortem deliveries are now rare.

Anything which causes the death of the mother before birth of the child is an indication for postmortem cesarean section. This view is not held by some authorities. They maintain that delivery by the natural route gives better results. When death occurs late in the second stage of labor a prompt application of low forceps or a rapid breech extraction is the procedure of choice, but speed is essential and abdominal delivery can be accomplished far more quickly than delivery by the natural passage.

Almost the only disease in which a number of these procedures have been done without occasional success is cholera. Sudden death of the mother offers a better chance for the fetus than does a prolonged wasting illness, as in the latter case the mother uses oxygen at the expense of the fetus. In prolonged fatal illnesses antemortem delivery must be performed to insure the birth of a living baby.

Speed is essential for the happy outcome of the operation. The sooner the fetus can be delivered after death the better are the results obtained. The usual estimate of the maximum time which the fetus can live in utero following death of the mother is 20 minutes, and reports other than that may be subject to doubt.

If possible, when performing a postmortem cesarean section, the same aseptic technique should be maintained as is used in an ordinary abdominal operation, because some apparently dead patients who have been subjected to this procedure have later been found to be alive. Women in a cataleptic state have quite frequently been operated upon in this manner.

The abdomen and uterus are opened by bold incision. Following delivery of the child the placenta should be removed and the cavity of the uterus inspected.

The moral obligation of the physician is to save life and he must deliver the unborn child of the dead mother. Consent of the husband or next of kin is not necessary. No legal action could be taken against a practitioner who in a suitable case made section without this consent. The right of the child to a chance for its life would be counted far superior to the rights of the husband in the body of the dead mother. Should the husband be readily available, however, it is considered wise to ask his consent to the operation. Failure to receive it should in no way sway the physician from his moral duty. In this country and in England, where there are no laws to the contrary, it is doubtful whether action could be taken against a physician for not having performed postmortem section, because of the uncertain results of the operation and because of its inadvisability as considered by some authorities.

Children born by this route have the same inheritance and property rights as children born naturally.

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* Read before the Society October 28, 1931.

CASE REPORT

Patient L. H., aged 29 years, colored, married. Admitted to Columbia Hospital February 24, 1930, at 4:30 p.m. Past history negative. Primipara, estimated date of confinement March 1, 1930. For two months previous there had been considerable edema of the feet and ankles, and for the two weeks previous there had been noticeable edema of the face. For the past few days the patient had had blurring of vision and spots before her eyes and had suffered constant severe headache. At this time her physician became alarmed and advised her to enter the hospital. On admission there was considerable edema of the face, abdominal wall, legs and feet. B.P. 230/130. Urine contained 2 plus albumin with a few hyaline casts and occasional red blood cells. Diagnosis of pre-eclamptic toxemia was made and treatment begun. Three hours later the patient had a typical eclamptic convulsion. Response to treatment was favorable, and the following morning, February 25, it was decided to induce labor. In preparation for insertion of a Voorhees bag the patient was given nitrous oxide-oxygen anesthesia. During vaginal examination the patient had another convulsive seizure. Respiration stopped immediately and the patient's heart sounds were inaudible. Artificial respiration was resorted to and stimulants used to no avail. During this time violent fetal movements were perceptible and the fetal heart was distinctly audible, although its rate gradually became slower. About 7 minutes had elapsed since cessation of respiration when postmortem cesarean section was performed, and a living female child weighing 7 pounds and 5 ounces was delivered. There was a scalpel wound over the right scapula. The infant remained in the hospital one month and was discharged in good condition. It is living and well today.

DISCUSSION

Drs. W. Preston Haynes, Robert Young Sullivan, J. Bay Jacobs and **Prentiss Willson.**

Science Series. No. 3

VOMITING

JAMES L. MACKAVANAGH*
AND
THEODORE KOPPANYI, PH.D.
Professor of Pharmacology and Materia Medica, Georgetown University School of Medicine

Vomiting occurs very frequently in animals. It is always preceded by retching movements and nausea. A nauseated animal can easily be recognized by its depressed appearance, licking of its chops, frequent swallowing, and excessive salivation. Certain animals, such as herbivorous mammals, cannot vomit or retch; but they occasionally show all the typical symptoms of nausea. Vomiting is a true reflex apparently designed to remove irritant and poisonous matter from the upper part of the gastro-intestinal tract. Since carnivorous animals are far more apt to swallow poisonous substances than are pure vegetarians, it is not surprising that they have a more easily stimulated vomiting reflex. Almost everybody has seen dogs and cats vomit, and perhaps there is no other sign or symptom of human disease which is as frequently encountered by the clinician as emesis.

Despite the tremendous significance of vomiting in human nosology, the mechanism of vomiting received only scanty attention before the latter part of the 19th century. In 1890 Thumas, a Polish pathologist, removed a portion of the floor of the fourth ventricle in the region of the calamus scriptorius in dogs. He found that the animals failed to respond to the usual emetic stimuli; and when he placed some apomorphine upon the uninjured floor of the fourth ventricle, nausea, retching, and vomiting quickly ensued. He concluded that the floor harbors a nerve center for the vomiting reflex.

The second great stride towards the understanding of the mechanism of vomiting was made by Hatcher and his pupils (1923) at Cornell University. Hatcher and Weiss systematically applied extremely small amounts of apomorphine to the floor of the fourth ventricle, and finally implicated the region of the ala cinerea. Whereas one-eighth of a milligram per kilo of body weight was the minimal effective dose when injected subcutaneously or intravenously, only one-thousandth of that amount produced emesis when applied to the portion just above the calamus scriptorius. They destroyed the nucleus of this region, injected apomorphine, and found that their dogs were incapable of vomiting. Koppanyi (1930) found that the inability to vomit after destruction of the nucleus of the ala cinerea may persist for only twenty-four hours indicating that perhaps this temporary impairment of the vomiting reflex was due to edema set up by trauma in the region of the true vomiting center. He then destroyed larger areas in the floor including major portions of the nucleus of the solitary tract, or sensory nucleus of the vagus, and his dogs were permanently unable to vomit following the injection of apomorphine. Later, however, he found that the same animals which had thus failed to vomit after apomorphine injection did vomit if they swallowed irritant emetics.

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* Sophomore Medical Student, Georgetown University School of Medicine.

Koppanyi's experiments permit a new classification of emetics. Orally administered irritant emetics, such as copper sulphate, zinc sulphate and tartar emetic, cause vomiting even in the absence of a medullary center. On the other hand, emetics given by injection, such as apomorphine, pilocarpine, tartar emetic and digitalis, fail to produce emesis after ablation of a medullary center or its temporary paralysis brought about by the local application of a morphine sulphate solution (4 per cent) to the floor of the fourth ventricle.

Most, perhaps all, cases of spontaneous human vomiting are probably controlled by a center in the fourth ventricle. This center may be stimulated in three ways:

(a) By direct action of substances circulating in the blood, such as bacterial toxins.

(b) By stimulation of afferent emetic endings in any part of the body, but especially of those whose fibers run in the vagus and glosso-pharyngeal trunks and terminate in the nucleus of the solitary tract. Faradic stimulation of the central end of the gastric vagus, for instance, produces nausea, retching, and vomiting.

(c) As a conditioned reflex from stimulating of the special senses (e.g., vestibular apparatus) and the higher centers of the brain.

The efferent arm of the vomiting reflex arc is also multiple in nature, as it involves the visceromotor vagus, the phrenic, the splanchnic, and certain spinal nerves. Thus the act of vomiting is doubly safeguarded, for vomiting is possible when either the vagi or all the spinal nerves have been cut, and we must not forget that a dog can show violent retching movements following the administration of apomorphine even if the whole gastro-intestinal tract has been removed.

The act of vomiting is preceded either by a period of very brief or prolonged nausea. The swallowed saliva accumulates at the end of the esophagus until the cardia of the stomach is opened. At that point retching is elicited by a synchronous violent contraction of the diaphragm, abdominal muscles and the stomach, with the relaxation of the cardiac sphincter. Then the cardia closes, and the vomitus is expelled from the esophagus. In prolonged vomiting reversed peristalsis of the small intestine gives rise to relaxation of the pyloric sphincter and bile and intestinal contents pass into the stomach. The pyloric sphincter then closes, and with a new contraction of the stomach new vomitus is expelled into the esophagus. Thus it becomes possible that not only gastric contents but bile and in especially severe cases even feces, is ejected through the esophagus.

The emetics which provoke vomiting by systemic administration in far less amounts than by gastric administration are usually referred to as centrally acting emetics, although they do not appear to stimulate the vomiting center directly. What they probably do is to lower the threshold of the vomiting center to afferent emetic impulses which are continually reaching it from almost every part of the body. If, for example, the afferent sympathetic emetic endings are paralyzed by ergotoxin, the injection of apomorphine no longer produces vomiting. On the other hand, some other emetics will still cause emesis.

The emetic par excellence is apomorphine, since gastric irritation is avoided by the prompt and efficient evacuation of the stomach and duodenum. Apomorphine ($C_{17}H_{17}NO_2$) is obtained by removing one molecule of water from morphine, but this slight structural difference is sufficient to cause quite a distinct difference in its pharmacologic action. Morphine fleetingly stimulates and then depresses the vomiting center along with the other medullary centers, but apomorphine is without this secondary depressant effect, which is an obvious advantage.

Even apomorphine, however, which is the best of the emetics, is not nearly as beneficial to the patient as judicious gastric lavage. The act of vomiting as induced by an emetic is protracted and vigorous, and may terminate in utter exhaustion and collapse. Even if the final stages of exhaustion do not appear, the inevitable bodily depression aggravates the harmful effects on the patient of such substances as caused the need for emesis to be instituted.

Tartar emetic, which is the double tartrate of antimony and potassium, has both a central and a local gastro-intestinal action. This may be demonstrated by injecting large quantities of the drug into an eviscerated dog, the animal responding with the retchings characteristic of an attempt to vomit.

It is probable that many of the toxins causing emesis work by a central effect instead of producing irritation in other parts of the body, as has been suggested. The vomiting of intestinal obstruction, acetonemias, early pregnancy, and eclampsia belong in this class.

Copper sulphate precipitates the proteins of the gastro-intestinal mucosa. A 1 per cent solution is sufficient to produce a thorough emesis. Whether the afferent endings of the vagi are stimulated by changes in tension due to the astringent action on the surface layers, or whether the proteins in the nerve-endings themselves are affected is difficult to tell.

Zinc sulphate has an action identical with that of copper sulphate, except that its irritating effects are not as marked.

Ipecac is derived from the root of the South American plant, Cephaelis ipecacuanha, and contains two emetic alkaloids, emetine and cephaeline. It is a powerful irritant when administered orally in quantities of about 1 gram, and although it has been used in many households as an emetic, it produces gastric catarrh.

Mustard is another time-honored household emetic, even though many a good housewife in the general excitement has forgotten to administer it with the requisite warm water. Fortunately, when mustard is given under conditions not precisely scientific, it is usually followed by many varied conglomerations of substances from the pantry shelf which would produce emesis by themselves.

It is when we consider the influence of the higher centers of the brain on the vomiting center that we see the intricacies of what may seem to be a simple protective reflex. That emesis is readily induced by disturbances of the organ of equilibrium in the internal ear is quite evident, as witness the vomiting of sea-sickness. It is a constant finding that decerebellated cats are prone to nausea and vomiting. These are fairly obvious forms of insult to the organism; the reflex may be activated by much more delicate and perhaps hitherto unsuspected causes. For instance, is post-anesthetic sickness due to the irritant gas used? If so, why does vomiting occasionally occur after the use of nitrous oxide or even a spinal anesthetic? The English surgeon, MacKenzie, found that trauma to sensitive tissues, even though the subject felt no pain, could evoke a vigorous protest; that the mental condition of the patient both before and after the operation is of paramount importance in the prophylaxis of post-operative vomiting. The apprehensions occasioned by the unfamiliar sights and smells of the hospital as well as the unnatural taking away of one's faculties, especially by some "impersonal stranger," the anesthetist, all constitute a basis for considerable emotional shock. Thus, post-anesthetic sickness seems to be in many instances the result of pre-operative unpleasant experiences. Indeed, it is not uncommon for persons to become violently ill upon smelling an odor similar to that of the anesthetic they were given in a tonsillectomy some years before.

Since no discussion of the pharmacology of vomiting would be complete without a consideration of the emetic depressants as well as the more familiar stimulants, the various means suggested for the treatment of vomiting will be briefly reviewed.

It was found that morphine and the other opiates are fleetingly emetic and then strongly anti-emetic. However, this latter action is of little value in the field of therapeutics, due to the possible danger of addiction. The drug is, however, the only true anti-emetic known. It has been found that vigorous dosing with bromides may result in abolishing the vomiting reflex from the back of the throat, but the other effects more that counterbalance the small good obtained. Koppanyi has found that the local application of large doses of atropine to the gastric mucosa lessens the vomiting due to gastric irritants. In human beings, however, only seldom is beneficial effect upon persistent vomiting seen from the use of atropine. He also found that large doses of analgesics, such as antipyrine and amidopyrine, produce vomiting only several hours after their administration. He concluded, therefore, that somehow or other they must have depressed the vomiting reflex, but when he attempted to suppress apomorphine vomiting by reasonable doses of such analgesics, he found that to be impossible. Thus we may conclude that of all depressants acting upon the central nervous system, only the opiates are true anti-emetics, and other depressants are utterly unreliable.

Mechanical protection is somewhat more efficacious than the use of the central depressants mentioned above. The household remedy, lime-water, is a mild gastric astringent sufficiently strong to produce the formation of an insensitive lining along the gastric mucosa without stimulating the nerve-endings as do copper and zinc sulphate. The effect of bismuth subnitrate or subcarbonate is also slightly astringent as well as mechanically protective against irritating substances.

Another means of relieving vomiting is the use of counter-irritants. Carbonated waters, which contain the mildly irritant carbonic acid, are usually beneficial in the treatment of the less violent manifestations. Another method is the use of ice bags or hot blanket packs, which have been found valuable even in cases of persistent vomiting. The exact manner in which these counter-irritants act is not known, but it seems probable that they would be quite useful in the treatment of emesis of "nervous" origin which fails to respond to psychotherapy.

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PROGRAM, SOCIETY ACTIVITIES MARCH, 1932

March 9: Dr. Fred R. Sanderson: "Successful Brachial Embolectomy. Report of Case."
Dr. J. Lawn Thompson: "Intramuscular Injections of Solution of Liver Extract in Pernicious Anemia. Case Reports."
Dr. R. M. LeComte: "Transurethral Treatment of Prostatism."

March 16: Dr. John Alexander of Ann Arbor, Michigan: "Surgery as an Aid in the Management of Pulmonary Tuberculosis."

March 23: Dr. Charles Stanley White: "Riedel's Struma."

March 30: Program by the Section on Pathology.

PROGRAM, SOCIETY OF HOSPITAL INTERNS OF THE DISTRICT OF COLUMBIA FOR MARCH*

March 9: "Bank Connections of the Professional Man." Mr. Joshua Evans, Jr., President of the District National Bank.

March 23: "The Relation of the Prescription to the Pharmacy." Dr. David Maxwell, of Maxwell and Tennyson, Pharmacists.

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THE FUTURE OF WASHINGTON AS A MEDICAL CENTER

Washington is the logical city for a great medical center. As the Nation's capital it is the center of many things—government, libraries, museums, commercial institutions, the sciences, etc. The supremacy of Washington medically, however, has been slow of evolution. There are several reasons for this: (1) lack of sufficient solidarity, leadership and organization of local members of the profession, (2) lack of interest of philanthropists in the development of things medical in this locality, (3) the overshadowing of medicine by other things of more general interest, (4) the proximity of a medical center, Baltimore, and (5) the slow development of the already existing local medical institutions of learning. The stage is set, however, for advancement in the medical field. Well trained young men are establishing themselves in the community, and with them comes the enthusiasm of youth and a desire to be at the head of the procession; the medical schools are taking on new life and stimulating each other by healthy competition; the Medical Society is growing up. Organization, however, is still weak. Medical men are so engrossed in their own personal problems that they are not acting in concerted fashion. They still allow their private reputations to be their foremost consideration.

It is probably very discouraging to many of the younger men coming from old established medical centers to find such a relative lack of organization in the schools and hospitals. If, however, instead of isolating themselves they determine to help develop the institutions here into ones similar to those in which they have worked, they will probably live to be proud of the results of their efforts. If, on the other hand, they are easily disheartened, the task will fall to the more stout-hearted, who will succeed in the end, but with great delay in the attainment of their goal. It is essential, therefore, that these young men to whom reference is made realize that those in authority in the medical institutions of the District of Columbia are pushing plans forward as rapidly as possible to elevate the standard of their institutions. They are not asleep, nor are they content with present conditions.

The greatest difficulty at present is in getting these younger men to give their whole-hearted coöperation. They must remember that they are no longer tied to the apron strings of 'medical giants,' but that they themselves must now play the rôle of the giant. This means the assumption of leadership with all of the responsibility involved, but at present with little of the glory. What greater happiness is there, however, than that which comes from success after hardship, from the development of a lovely structure as the result of one's own efforts and from the attainment of one's ideals?

Time and energy must be given and given unselfishly. Haste defeats effort. The way to serve best in the development of Washington medically is to painstakingly do one's best in the wards, in the outpatient departments, in the class rooms and in the laboratories. Each case must be 'worked up' to the nth degree and followed consistently even in the home. Careful records must be kept in order that they may be used later for study. Even though the highly perfected machinery that one has been accustomed to for doing these things is not yet at hand, slowly but surely that machinery will be assembled if each man persists in doing his best in his particular field. Enthusiasm, thoroughness and persistence will in the end bring a satisfactory reward.

One fault with the younger men is 'spreading their efforts too thinly.' Many of them seem to think that the more institutions they are connected with the greater is their reputation and the larger will be their private practice. Never was there a more fallacious premise. By attempting to do a great deal they are doing little in any one place. They rush from hospital to hospital, doing a little here and a little there, but really doing nothing very well anywhere. How unsatisfactory this must be both to themselves and to the institution. Far better would it be for all concerned if they would devote their entire time to one place. Fewer men could thus accomplish much more than many are accomplishing now.

Investigative work must be done. Every medical man should tackle some problem, no matter how small, and work diligently toward its solution. He thus not only becomes a scientific physician or surgeon, but by adding some little fact to the bulk of medical knowledge he is helping to make progress in the conquest of disease and toward the prolongation of life. In addition his own reputation, that of the institution in which he works and that of Washington itself will be enhanced. A dozen men doing work of this sort will soon cause the spotlight of medical interest to be directed this way.

The development of an esprit d' corps is essential. The basis of this is the belief that one's own should be first. Referring patients to institutions or physicians in other cities thwarts the development of this esprit d' corps. Let us support our own consultants, who are as good as can be had anywhere, and let us educate our patients to be satisfied with the medical talent of our own city.

In justice to the medical men of Washington who have borne the standard of medical progress in years past it is well to comment here upon the valiant service rendered and upon the enviable reputations which many of them have attained. Unfortunately their efforts have been productive more of glory to individuals than to the medical profession of Washington as a whole. Concerted and organized activity must take the place of personal ambition. Washington physicians have occupied important positions in national organizations. It is hoped that such men of ability will direct their efforts wholeheartedly to the problem of elevating Washington to the position it should occupy in the medical world.

If the physicians of Washington will but heed the pleadings of this homely editorial there can be little question of the future of the National Capital as a medical center.

THE CARE OF THE VETERAN

Under the auspices of the American Medical Association there is held each year a congress dealing with the problems of medical education, medical licensure and hospitals. The congress this year was held in Chicago on February 15 and 16; Dr. Ray Lyman Wilbur, chairman of the Council, presided at the opening session.

The following comments are not intended as a report of the proceedings of the congress but only as reference to a matter that is challenging the attention of the entire medical profession.

Dr. Wilbur's opening address dealt particularly with the rapid growth of veterans' hospitals since the War. The policy pursued by the government in furnishing hospital care not only for war-contracted illness but for all illness of veterans which necessitates hospitalization has resulted in a mushroom growth of veterans' hospitals, has removed a considerable percentage of patients from the normal stream of hospitalization and has completely changed the course of hospital development in the United States. If the government is to continue in the course upon which it has entered it must build more and more hospitals as the veterans become older. It seems clear that these hospitals will eventually become homes for aged and disabled veterans and at a little later period there will be an enormous number of empty beds. Such a condition will constitute a constant temptation to legislators to find ways to fill such hospitals. Dr. Wilbur stated his conviction very emphatically that the government has gone far enough in building veterans' hospitals. At a time when about 23 per cent of the beds in civilian hospitals throughout the country are constantly empty, means should be devised to utilize them for veterans instead of increasing the number of hospitals built and controlled by the government. It takes time to work out great social problems and time should be given for the hospitals of the country to adjust themselves to new problems. Medical care must continue to center around the patient and not around a bureaucratic administration of hospitals. The growth of hospitals must not be so distorted that they control the practice of medicine. It is as important to keep the hand of the self-seeking politician out of the care of the sick as it is to keep it out of our educational system.

The importance that the care of the veteran has attained in medical thinking is shown by the fact that an entire forenoon of the congress was given to its consideration. Dr. H. H. Shoulders, Secretary of the Tennessee State Medical Association, presented his plan for providing for the care of veterans in existing civilian hospitals, that is, in so far as those diseases and disabilities are concerned which would usually be cared for in such hospitals. Mr. Paul H. Fesler, President of the American Hospital Association, succeeded Dr. Shoulders on the program. He presented facts to show that existing hospitals have adequate facilities to care for all non-service disabilities of veterans. He presented a pamphlet prepared by the American Hospital Association containing the results of a questionnaire with regard to beds available for veterans throughout the United States. Seventeen hundred and sixty-nine hospitals offer to place at the disposal of the United States government 28,333 hospital beds. The following statements and resolutions are published in the pamphlet referred to above:

"There is no reason why any of our soldiers who need care should not be hospitalized in a good hospital near his home without any delay. There is no occasion for any veteran to be on any list waiting for admission to a hospital unless he is suffering from mental or nervous disease or tuberculosis. Our civilian hospitals have, and offer, the facilities for the best of care for our sick and disabled soldiers at no greater cost to the government than it is paying at present."

The American Hospital Association adopted without a dissenting vote the following resolutions:

"Whereas the Government of the United States has increased its provisions for the medical care of veterans by including patients disabled by causes other than those attributed to the hazards of service, with the evident intention of the Congress to insure to veterans opportunities for medical and surgical care equal to those enjoyed by any citizen;

"And Whereas," (here follow numerous statements of the availability of beds in civilian hospitals and of reasons why veterans will benefit by their use). The statement closes with the following resolution:

"Be It Resolved that the Trustees of the American Hospital Association, in interest of the veterans, and also for the purpose of avoiding unnecessary expense to the country and the public in general, earnestly recommend to the Veterans' Bureau, the veterans' organizations, the Congress and all others having the welfare of the veterans at heart, a consideration of the facilities for the care of injuries and acute illnesses offered by available civilian general hospitals under conditions similar to those now enjoyed by veterans suffering from service disabilities, and further recommend that action be taken so that the use of available civilian hospitals, with provision for proper medical care, be the privilege of all veterans requiring general hospital treatment."

It seemed to be the very general sentiment in the Congress that intrusion of governmental paternalism should be avoided not only in the care of veterans but of the sick in general. If, however, the Uuited States Government is determined to follow the plan already adopted to take care of veterans in illnesses with no service connection some such plan as that proposed by Dr. Shoulders should be adopted. It would cost less, would provide better for the veteran's care and would avoid the incubus of a tremendous building program for veterans' hospitals.

A. C. C.

ANNUAL MEETING, MAY 4TH AND 5TH

This year the prospects for a meeting productive of scientific promotion and friendly contact with the citizenry of the District of Columbia seem unusually bright. Both days, according to present plans, will be available for viewing a scientific exhibit being arranged by Dr. Eugene R. Whitmore. This will include not only pathology with correlated clinical findings, but laboratory demonstrations of much value in the promotion of the basic medical sciences. A number of firms will take space in our library, giving an instructive commercial exhibit. Addresses by outstanding out-of-town speakers with papers by our own members will be presented on both days.

Participation in the Bicentennial Celebration by the Medical Society of the District of Columbia is especially appropriate in that some of our earlier members were in intimate contact with the first President. On Thursday evening, May 5th, addresses including references to the early history of medicine in the District of Columbia will be given. The outlining of the life work of earlier members, such as Dr. Elisha Cullen Dick, particularly their contacts with George Washington, are being prepared for presentation. The public is invited to attend.

The complimentary get-together luncheon, to which all guests of the Society and members are invited, will as usual be given at the Mayflower Hotel.

Members interested in making presentations at the annual meeting are advised to get in contact with Drs. E. W. Titus and Eugene R. Whitmore, submitting a prospectus of their paper or demonstration. The Committee actively engaged in making arrangements has the following personnel:

Ralph M. LeComte, Chairman
C. N. Chipman, Vice Chairman
Jerome F. Crowley, Vice Chairman
F. X. McGovern, Vice Chairman
Grafton Tyler Brown, Attendance
F. A. Hornaday, Luncheon
A. B. Bennett, Halls
Eugene R. Whitmore, Exhibits
A. Frances Foye, Women Physicians
E. W. Titus, Program
James A. Cahill, Jr., Hospitals
Joseph S. Wall, Publicity
Wallace M. Yater, Public Meeting
Coursen B. Conklin, Registration

NEW COMMITTEES

The following committees have recently been appointed by the President, Dr. Arthur C. Christie:

(1) To Cooperate with the Social Hygiene Society—

Walter R. Stokes, *Chairman*
H. Gladys Kain
J. H. Russell McNitt

This committee was appointed at the request of the Social Hygiene Society. It has long been thought that a liaison by committee between the respective organizations was most desirable.

(2) Advisory Committee to the Woman's Auxiliary to the Medical Society of the District of Columbia—

Arthur C. Christie, *Chairman*
Prentiss Willson
A. B. Bennett

Heretofore the Auxiliary has had through informal contacts opportunity for learning how they may best serve the organized profession. Now, through the appointment of the President, the Chairman of the Executive Committee and the Chairman of the House Committee as a committee, much more progress is assured in the intelligent working out of policies.

ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Injection Treatment of Hemorrhoids,"* by **J. Russell Verbrycke**, Jr., M.D.

The treatment is applicable to intense and prolapsed internal hemorrhoids. Five percent quinine and urea has been used exclusively in this series. From 2 to 6 or 8 injections are usually necessary. Cure is effected by outpouring of lymph and not by thrombosis. Complications have been minimal. The following conclusions are drawn:

1. That the cure is as complete as after operative removal.
2. That if there should be a recurrence the relief is easier than after any other operation.
3. That it is safer than operation. It can be used in heart disease, high blood pressure, pregnancy, etc.
4. That hospitalization expense is saved as well as loss of time.
5. That it is less painful than operation and that pain is at once relieved.
6. That general anesthetic and its attendant dread are saved. Even local anesthesia is not needed.
7. That with all of these advantages the patient gladly consents to the treatment instead of postponing until the condition can no longer be tolerated.

Discussion: Drs. Wm. B. Marbury, Joseph Horgan, Herbert P. Ramsey, Anna Bartsch-Dunne, and H. C. Macatee.

"The Urea Clearance Test of Kidney Function,"† by **Joseph H. Roe**, M.D.

Urea clearance is the number of cubic centimeters of blood cleared of urea per minute. It is determined as follows: A sample of urine is collected for a measured time (1 hr. or 2 hrs.). During this time a sample of venous blood is collected. The blood and urine are analysed for their urea content and the rate at which the kidneys remove urea from the blood is calculated.

The mean normal urea clearance is set at 100 per cent. Values ranging from 80 per cent to 160 per cent of the mean normal are obtained upon normal subjects. Values below 80 per cent of the mean normal indicate lowered urea clearance; advanced kidney lesions show a clearance below 40 per cent; and terminal cases show a clearance around 5 per cent.

A lowered urea clearance is produced by either (1) damage to the glomeruli, or (2) a reduced flow of blood through the kidneys. The test will give critical information in: (a) all of the forms of glomerulonephritis; (b) a nephrosis that has progressed to an extent that will diminish the renal bloodflow.

The greatest value of the urea clearance test is in the diagnosis of early kidney lesions. The test will indicate early renal changes before azotemia occurs and before other tests of renal function indicate renal insufficiency.

Discussion: Dr. Walter Freeman.

"Hypersensitiveness to Fungi,"* by **Grafton Tyler Brown**, M.D.

Microorganisms may be divided into four distinct groups, namely: the Schizomycetes or bacteria, the Hyphomycetes or molds, the Blastomycetes or yeasts, and the protozoa. The bacteria, molds, and yeasts belong to the plant kingdom, whereas the protozoa belong to the animal kingdom. Fungi, in addition to molds and yeasts, include rusts, smuts, mushrooms, etc. The molds have been classified into five families, with several hundred genera and thousands of different species. From the viewpoint of allergy, this is a vast unexplored field, and I have selected for study those varieties which have already been reported by other investigators, and also all the different fungi (molds and yeasts) that could be cultured from patients' skin lesions, sputum and nasal secretions, stools, and environmental dusts (house and mattress).

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* Presented October 14, 1931.

† Presented October 21, 1931.

* Presented December 9, 1931.

Hypersensitiveness to fungi must take its place along with sensitization to pollens, animal epidermals, foods, and bacteria in the causation of asthma, eczema, and other related allergic conditions.

The method of diagnosing and treating hypersensitiveness to molds and yeasts is essentially the same as that used for other types of allergenic substances.

Dr. Thom has wisely said that "the Penicillia, the Aspergilli, and the Mucors are the weeds of the culture room." I would add that molds are the weeds of the home. Every specimen of house or mattress dust that has been cultured was found to contain various fungi. The potentiality of molds being air-borne may be appreciated if we compare the size of the ubiquitous spores with the size of pollen grains The average diameter of mold spores is from 3 to 5 microns, whereas the diameter of the common air-borne pollen grains is from 15 to 40 microns.

In this paper, I have given the results of an intensive study of hypersensitiveness to fungi, including a review of the literature, and the report of a number of illustrative cases.

Discussion: Drs. Charles Thom, Principal Mycologist, United States Department of Agriculture, and Harry S. Bernton.

ACTIVITIES OF MEDICAL DEFENSE COMMITTEE

Payment of your dues for 1932 on or before March 31st, 1932, means the assurance of the protection that may be extended by the Medical Defense Committee. This committee considers the evidence filed against members in suits for alleged malpractice. It has accomplished much. Even though you carry protective insurance, and all are urged to carry an adequate amount, the committee's cooperation is of inestimable value. At the present time certain members carrying no insurance are being defended through this committee's good offices. *Pay your 1932 dues before April 1st, 1932. Keep in good standing.*

THE WOMAN'S AUXILIARY TO THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

(*Mrs. E. R. Whitmore, Chairman, Publicity Committee*)

Mrs. Edward L. Morrison is in charge of the Motor Corps, which is composed of members of the Auxiliary who furnish their automobiles for activities carried on by the corps. Three days a week they take the welfare workers from the hospitals on their round of duty. On two days a week they carry groups of children to the hospitals for physiotherapy.

The Hygeia Committee, of which Mrs. C. W. Culver is Chairman, has placed "Hygeia" in one hundred homes in the District of Columbia. Other auxiliaries are showing excellent results in the Hygeia Campaign. The Colorado Auxiliary Hygeia Chairman points out that placing Hygeia in the homes is an effective way to meet our obligation to provide physical, mental and social help for all children.

The California Auxiliary is offering prizes for the three best papers on "Educating a Doctor's Wife," the contest being open to any doctor in California in good standing in the State Society, his wife and children. California Auxiliaries have talks by physicians and laymen as part of their program.

Illinois Auxiliaries are carrying on studies in Health Education, contagious disease control being their theme for this year.

The Arkansas Auxiliaries are giving special co-operation in public health measures of the State, stressing the study of communicable disease control, urging diphtheria immunization, and helping undernourished tuberculous children.

Mrs. Joseph Hume of New Orleans is the Chairman of the Committee on Arrangements for the next convention of the Woman's Auxiliary to the American Medical Association which is to be held in New Orleans, May 9–13, 1932.

The National Chairman of Press and Publicity urges all auxiliary women to read the delightful letters from our National President-elect, Mrs. Walter Jackson Freeman, appearing every month in the Bulletin of the American Medical Association.

JEFFERSON ALUMNI MEET

Alumni of Jefferson Medical College of Philadelphia met Friday, February 19, at the University Club. Members of classes from 1877 to 1931 attended. Dr. Orlando Ducker was graduated in the class of 1877. Others present with their class year: Harry T. Guss,* 1886; Jesse Shoup,* 1891; F. C. Smith, 1903; H. C. Woolley, and John H. Trinder,* 1904; E. L. Morrison,* 1905; F. A. Carmelia, 1911; Ralph J. Haws,* 1915; John R. Logan,* and George K. Nutting,* 1916; James Hawfield,* 1918; I. Lewis Sandler,* and L. R. Marshall, 1926; Ernest G. Smith, Lieut. John E. Blatt and E. P. Schwartz, 1930. A Jefferson Medical Society was organized. It is proposed to hold meetings on the fourth Saturday of the month. Dr. George K. Nutting was elected Chairman.

REPRINTS RECEIVED

The following reprints have recently been received for which due acknowledgment is made:

"The Relations of Dental Infections to Maxillary Sinus Disease," The Laryngoscope, December, 1931, by Victor R. Alfaro, M.D.

"Postvaccinal Myelitis, Report of a Case," Journal of the American Medical Association, July 25, 1931, by T. Wm. Brockbank, M.D.

"Therapeutic Malaria In Private Practice," Southern Medical Journal, November, 1931, by Walter Freeman, M.D.

"The Roentgen Treatment of Agranulocytosis," American Journal of Roentgenology and Radium Therapy, January, 1932, by Leslie T. Gager, M.D., and Alma Jane Speer, M.D.

"L-Shaped Rubber Tube for Draining The Biliary Tract," American Journal of Surgery, September, 1931, by Edmund Horgan, M.D.

"Contra-Indications for Laparotomy," Virginia Medical Monthly, November, 1931, by William J. Mallory, M.D.

"Who Shall Control The Expenditure of Tax Moneys?" by William Gerry Morgan, M.D.

"Lung Abscess Following Tonsillectomy," Archives of Pediatrics, November, 1931, by Joseph S. Wall, M.D.

"Should The Barriers Against Typhoid Be Continued?", Journal of American Medical Association, January 9, 1932, by James G. Cumming, M.D.

"Maximum Dosage in Pollen Therapy," Journal of Allergy, January, 1932, by Grafton Tyler Brown, M.D.

"Roentgenologic Diagnosis of Appendicitis," Journal of the American Medical Association, November 14, 1931, by A. B. Moore, M.D., and E. A. Merritt, M.D.

"The Relation of Radiology to Other Branches of Medical Practice," Journal of the American Medical Association, May 23, 1931, by Arthur C. Christie, M.D.

"Mixed Tumors of the Parotid Gland," American Journal of Roentgenology and Radium Therapy, April, 1931, by Edwin A. Merritt, M.D.

"The Relation of the American Journal of Roentgenology and Radium Therapy to the Development of Radiology," American Journal of Roentgenology and Radium Therapy, October, 1931, by Arthur C. Christie, M.D.

"Radiology as a Career," Journal of Radiological Society of North America, June, 1931, by Thomas A. Groover, M.D., D.Sc.

"Gunshot Wound of Ureter," Journal of Urology, September, 1931, by R. M. LeComte, M.D.

RESOLUTION ADOPTED BY THE SOCIETY MARCH 2ND

Resolved, That all meetings of this Society devoted entirely to memorial exercises in memory of a deceased member shall be held within six weeks after the death of the deceased member for whom the memorial meeting is held, except in the case of some member whose death occurs during the Summer recess of the Society; and that all such memorial meetings shall be held only for deceased members who have been distinguished in the art of medicine and have rendered unusual service to this Society or to the Public Welfare. All proposals for memorial meetings must be considered by the Executive Committee before being submitted to the Society for final action.

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* Member, Medical Society of the District of Columbia.

TUBERCULOSIS ABSTRACTS

This Review Issued Monthly by the National Tuberculosis Association is Furnished by the Association for the Prevention of Tuberculosis of the District of Columbia.

THE pathology of pulmonary tuberculosis is difficult to understand because a complex terminology has been created to "pigeon-hole" certain gross appearances of the tuberculous lung. Our mental pictures of tuberculosis pathology would be clarified were we to disregard the terminology in vogue at present and in its place interpret the whole process on the basis of inflammation and repair. All stages from acute inflammation to advanced repair may be found in different portions of one tuberculous focus. Such are the conclusions of Medlar and Sasano, who studied the pathology of pulmonary tuberculosis in successive stages in animals. Extracts from the article follow.

PATHOLOGY OF PULMONARY TUBERCULOSIS

Tuberculosis is often set aside as a disease of distinctive pathology. It is probably true that there is some chemical specificity in tuberculous infection but morphologically the lesions represent biological reactions corresponding to those of inflammation and repair observed in infectious diseases generally. Under certain conditions, for example, tubercle bacilli may incite abscess formation and under other conditions tubercle formation. Such terms as "proliferative type," "exudative type," "caseous pneumonia," "chronic fibroid phthisis," cause confusion. They do not represent "specific" lesions, but merely stages, combinations of lesions, or appearances in the course of pathological development.

The authors studied pathological changes produced in rabbits by a very virulent strain of a bovine tubercle bacillus, whose characteristics were known by previous studies. By varying the dosage of bacilli it was possible to control in a large measure the number of tuberculous lesions. As nearly as possible all other factors were controlled.

Pulmonary tuberculosis in the rabbit differs in some respects from the disease in human beings, but doubtless the fundamental pathological principles are the same in both species. Probably the chief reason for the differences observed in the rabbit and man, is that in man previous contact with tubercle bacilli has developed some resistance to the infection, whereas the experimental animals experienced their first contact with the bacilli on the day they were inoculated. Another factor is that the rabbits were given a single injection, which contained far more tubercle bacilli than any person would inhale or ingest at a single exposure to infection.

Forty rabbits were uniformly inoculated and killed at different periods. Numerous blocks of tissue were then studied microscopically.

LESIONS FOUND AT AUTOPSY

The lesions found at various stages (illustrated and more fully described in the original article) were as follows:

After 48 hours

No gross lesions observed until after fixation. Then the organs were seen to be uniformly seeded with minute grayish spots which proved to be alveolar walls, congested and containing cellular exudate, consisting of mononuclear leucocytes and neutrophiles. An occasional mononuclear leucocyte or neutrophile was present in adjacent alveolar spaces. Tubercle bacilli difficult to find.

After 6 days

Lesions easily recognized in fresh specimen. They were discrete with normal intervening lung tissue and larger than those of 48-hour lung. Lesions were the result of increased congestion and of greater accumulation of leucocytes and neutrophiles. Alveolar walls were thickened. Adjacent alveoli were often filled with exudate of same cell types as in alveolar walls. No giant cells. No caseation. Tubercle bacilli more numerous.

After 12 days

Lesions were larger. Examination showed two types with gradations from one into the other:

(a) Typical mononuclear tubercles, composed wholly of mononuclear leucocytes. Adjacent alveoli contained from a few to many cells of this type. Tubercle bacilli present in small numbers.

(b) Abscess composed of neutrophiles in central portion and mixture of neutrophiles and nononuclear leucocytes in periphery. Adjacent alveoli often filled with mixture of neutrophiles and mononuclears. Bacilli numerous. The lung at this stage had all gradations of lesions from (a) to (b). Tubercle bacilli became more numerous in the foci as these approached abscess type. Several abscesses showed a beginning erosion of bronchial or terminal bronchiole walls, with slight amount of inflammatory mass lying free. In the free exudate tubercle bacilli were easily found. Lung tissue normal except for lesions described. No caseation, no giant cells.

After 21 days

Marked increase in size of discrete tuberculous lesions. Abscesses much larger, some undergoing caseation, others had eroded alveolar or bronchial walls. Contents of these abscesses were discharged into alveolar spaces or into bronchi or bronchioles. Lung parenchyma adjacent to lesions involved in the enlarging inflammatory process. Mononuclear tubercles rarely seen. No giant cells. Tubercle bacilli abundant in all lesions.

For the first time, definite extension of tuberculous process into previously normal tissue was seen. This extension had occurred in two ways:

(a) Focal lesions had enlarged and adjacent parenchyma had become involved, but major portion of lung tissue uninvolved.

(b) Extension had occurred as a result of rupture of the tuberculous abscess into bronchi or bronchioles. Inhalation of contents of ruptured abscesses caused involvement of new areas of lung. These were separate from the older lesions and were composed of small groups of alveoli filled with exudate. Alveolar walls surrounding these small foci appeared normal. New areas contained many tubercle bacilli.

From this stage on there occurred a continuation of the ulcerative process until eventually the lung became a solid mass of tuberculous tissue, and many of the lungs showed pyramidal areas of consolidation at their periphery, and at the apex of the consolidated mass, a tuberculous ulcer in a bronchus with considerable bacillus-laden exudate within its lumen.

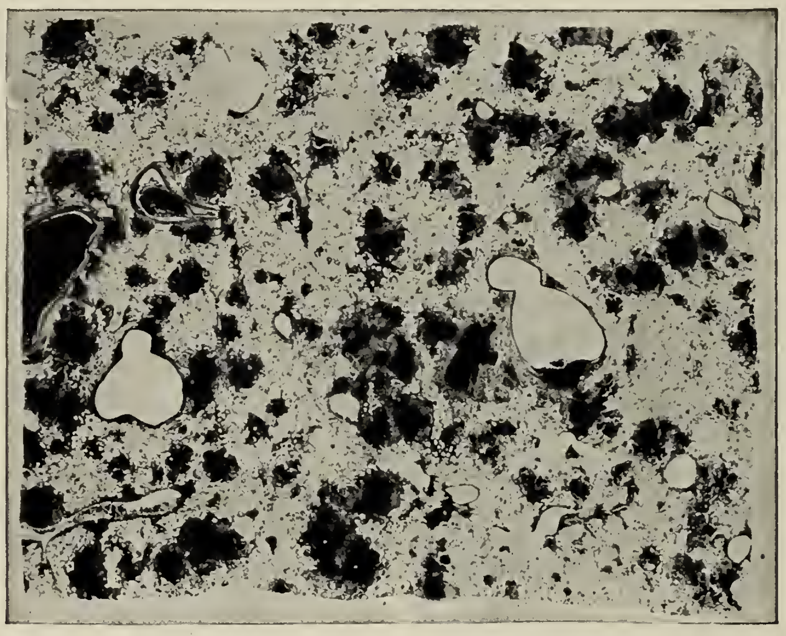
CONCLUSIONS

"1. Massive pulmonary tuberculosis in the rabbit is dependent upon the rupture of pulmonary tuberculous abscesses into the bronchial tree and inhalation of the contents of these abscesses into the previously uninvolved lung tissue. It seems plausible that this is also the method of extensive dissemination of tuberculosis within the human lung.

"2. The pathology of pulmonary tuberculosis is essentially a process of inflammation and repair. Interpreted upon the basis of inflammation and repair the complex pathology becomes greatly simplified and more easily understood.

"3. The complex terminology used to describe the bizarre pathology of pulmonary tuberculosis is unnecessary and confusing.

"4. The term 'specific' when used in connection with tuberculous lesions should be restricted to denote a biochemical, not a morphological specificity."—*An Interpretation of the Pathology of Pulmonary Tuberculosis, E. M. Medla and K. T. Sasano, Am. Rev. of Tuberc., Dec., 1931.*



Lung 21 Days after Infection Showing Various Types of Lesions; Abscesses, Caseation and Recent Lesions Due to "Spread" by Peripheral Extension and by Inhalation of Exudate from Ruptured Abscesses

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SCARLET FEVER

The Present Incidence

The Health Office in large municipalities becomes cognizant of the periodical return of contagious diseases. For instance, some years are notable for the small number of measles cases reported. These occurrences seem to come at stated intervals. It so happens that at the present time there are a comparatively large number of cases of scarlet fever existing in the District of Columbia. In order for the profession to cooperate fully in cutting to a minimum the incidence, it is necessary to report *promptly* to the Health Office the names and addresses of patients exhibiting manifestations of this disease. Scarlet fever has been well recognized as a disease that is frequently difficult to diagnose. With the modern refinements brought by the investigations of the Dicks and others, doubtful situations may now be solved. It so happens that there are frequently occurring scattered foci in Washington and environs where scarlet fever seems more prevalent. Some of these are in the outlying areas of the District. A full knowledge of the number and location of cases of contagious diseases is a prime requisite in Public Health work. The cooperation of all clinicians with the Health Officer to the end that spread by contact in schools and common places of gathering may be cut down to a minimum is greatly desired.

MEDICAL ANNALS
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THE PRACTICAL VALUE OF THE ELECTROCARDIOGRAM

LESLIE T. GAGER, M.D.

Professor of Medicine, Howard University School of Medicine

When a patient comes to the physician with symptoms referable to the circulation, there are two important indications to be met. In the first place the patient is entitled to a reasonably clear answer to the question, "Is this heart disease, or is it something else?" That 'something else' may be simple fatigue, a neurosis or psychoneurosis, or some toxic state, such as is due to tobacco, a focus of infection, abnormal thyroid activity, pulmonary tuberculosis or gall bladder disease.

Secondly, if heart disease is present or under the circumstances is thought to be possible or potential, modern cardiac diagnosis requires that the physician should learn what he can of (1) the etiology of the disease or abnormal signs and symptoms; (2) the anatomical and (3) the physiological changes which are present in the heart; and (4) the extent to which these alterations affect the patient's life and powers. All of these factors obviously influence the outlook, management and treatment of the patient and his disease. None can safely be ignored.

From these premises the conclusion can be drawn that the study of the heart calls upon broad experience in general medicine and at the same time a concentration of interest in certain fields of what is primarily pathologic physiology. Certain of these variations in myocardial function and structure are revealed by the electrocardiogram as a record of the action current produced by the beating heart. The purpose of this paper is to discuss the value of this information.

GENERAL PRINCIPLES AND METHOD

That the heart produces electrical currents was recognized by Matteuci in 1843 and with rather greater emphasis by Kölliker and Müller in 1856. In 1887 Waller found that he could register these electromotive changes in the human heart by means of electrodes applied to the surface of the body and connected with the capillary electrometer. In 1903 Einthoven made the electrocardiograph an instrument of the clinic by leading the heart current through a quartz fiber stretched in a string magnetic field and projecting the magnified movements of this string upon a moving photographic plate. To the epoch-making character of Einthoven's work and to the fine qualities of the man, his pupil Samojloff has recently paid charming tribute.

It was soon learned that the active portion of the contracting muscle is in a state of relative negativity to the resting portion, or in terms of the newer cellular physiology, that an activated muscle cell gives rise, in the process of depolarization and repolarization, to a diphasic current. The progress of this current, from its initiation in the sinus node of the right auricle to the auriculoventricular node, down the bundle of His and the right and left bundle branches and by way of the Purkinje fibers into the ventricular muscle and back again, is the story told by the electrocardiogram. Essentially it is a story in three parts, (1) of impulse formation, (2) of impulse conduction and (3) of the balance or imbalance of electrical stresses within the heart.

The respective clinical correlations are those (1) of abnormalities of rate and rhythm, (2) of heart block both in the main conduction system and within the ventricles and (3) the evidence of lack of anatomical and electrical balance as caused (a) by injury and degeneration of the myocardium, e.g., after coronary thrombosis, (b) by toxic changes, such as follow digitalization, and (c) by disproportionate activity of certain components of the heart, for example, the auricles in mitral stenosis or pulmonary stenosis, and the left ventricle in aortic insufficiency or hypertension.

Einthoven took off the action current of the heart by derivations or "leads" from the two arms and the left leg, and these have become conventional. Direct chest leads, antero-posterior leads and electrodes applied directly to the heart muscle have also given additional information concerning the spatial as well as time relationships of the myocardial electromotive forces. To the waves or deflections which occurred during the cardiac cycle Einthoven gave the names, merely for identification, of the letters P, Q, R, S and T (Fig. 1). A small U wave, sometimes following closely the T, has no clinical significance. The current is so led off that in the normal electrocardiogram the P, R and T waves are positive (above the isoelectric level of the heart at rest or in electromotive balance) and Q and S negative.

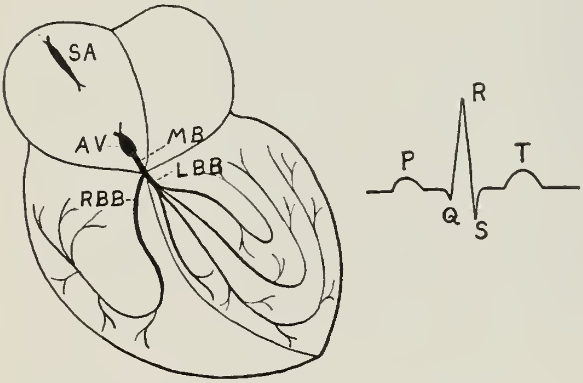

Fig. 1. Course of Excitation Wave from Sino-auricular Node (SA) through Auricles to Auriculoventricular Node (AV), Down Main Bundle (MB), Right and Left Bundle Branches (RBB and LBB) and Out Arborization of Purkinje Fibers into Ventricles

Schematic electrocardiogram with deflections

The P wave records the invasion of the auricles; the QRS complex marks the spread of the impulse in the ventricles. The P-R interval, since Q is usually absent or insignificant, is taken as the time of auriculoventricular conduction. The T wave records the electrical changes during the latter part of ventricular systole and is now regarded as due chiefly to retreat of the impulse. The S-T interval, usually a period of balanced stresses, indicates by large deviations the injury and inactivity of ventricular muscle.

Analysis of the Electrocardiogram

While the clinically important facts revealed by the electrocardiogram often may be read at a glance, the complete analysis of a record requires systematic study of many details. The most important electrocardiographic changes, together with the disorders which they represent, I have tried to summarize under the following heads:

1. Standardization

Accurate and comparable records and international convention require that 1 millivolt cause a deflection of 1 cm. in the galvanometer string without lagging or overshooting.

2. The P Wave

Important features are its identity, rate, regularity, size, contour and direction.

(a) Regular, rate 60–80, called normal sinus rhythm; rate below 60, called sinus bradycardia; rate above 100, called sinus tachycardia.

(b) Irregular, form unchanged in sinus arrhythmia; contour of direction varying (often inversion) in auricular premature beats and in wandering pacemaker.

(c) May be replaced by waves of auricular flutter (regular, rate 200–350), auricular fibrillation (irregular, rate 350–500), paroxysmal auricular tachycardia (regular, rate 110–200, P often inverted).

(d) May be absent in sino-auricular standstill (auricular silence).

(e) May be buried in nodal or ventricular premature beats, in beats of ventricular escape, in nodal or ventricular tachycardia, in idioventricular rhythm.

(f) May follow nodal or ventricular beat (retrograde P).

(g) Commonly inverted in auricular premature beats, paroxysmal auricular tachycardia, dextrocardia (mirror image of normal ECG).

(h) Often enlarged in auricular hypertrophy (mitral and pulmonary stenosis).

(i) Often decreased in hypothyroidism (general low voltage in ECG).

(j) Notching and prolongation may indicate auricular myocardial disease.

3. *The P-R Interval*

The normal conduction time is 0.12–0.20 sec. Impaired conduction indicates auriculo-ventricular heart block. Types of block are:

A. Partial block.

- (a) Above 0.20 sec., prolonged conduction time.
- (b) Occasional P without ventricular response (dropped beat).
- (c) Many P waves without ventricular response (high grade block).
  - I. Definite ratio (2:1, 3:1 etc.) of P to QRS (with normal sinus rhythm; commonly with auricular flutter).
  - II. Indefinite ratio (auricular fibrillation, ventricles irregular).

B. Complete block.

P without relation to QRS (nodal or idioventricular rhythm, rate 12–90).

4. *The QRS Complex*

Important features are rate, regularity, size, contour, duration.

A. Supraventricular type (under influence of sinus or A-V nodes).

- (a) Relation to P regular, 1:1, 2:1 ratios, etc., (sinus rhythm; partial block).
- (b) Without regular relation to P (auricular fibrillation).
- (c) Amplitude (normal average 12 mm.).
  - I. Increased (16–18 mm. or over) by ventricular hypertrophy.
  - II. Decreased (under 7 mm.) in acute heart failure, after acute infectious diseases, in hypothyroidism and asthenic states, in coronary narrowing and myocardial fibrosis, in large pericardial effusions.
  - III. Axis deviation,

    When $(R_1 + S_3) - (R_3 + S_1) = 30$ mm., left axis deviation (left ventricular preponderance) is abnormal (associated with horizontal displacement of heart; left-sided hypertrophy).

    When same algebraic sum is -15 mm. or more, right axis deviation is abnormal (displacement of heart to right; vertical position, right ventricular hypertrophy).

    When electrical axis is unchanged with shift of body from side to side, fixation by chronic pericarditis with adhesions is likely.
- (d) Duration (normal 0.08–0.1 sec., with ventricular hypertrophy, 0.12 sec.). Prolongation, with slurring and notching, indicates intraventricular block (sometimes functional, usually evidence of serious myocardial disease). Types of block are:
  - I. Bundle branch block. Large complex, main deflection upward in Lead I, downward in Lead III, T waves of opposite sign, indicate left bundle branch block (new nomenclature). Common, usually follows coronary disease. Reverse changes, main deflection downward in I, upward in III, indicate right bundle branch block. Less common.

II. Arborization block (partial intraventricular block). Small complex, marked splintering or notching.

B. Ventricular type. Origin in ventricle, single or multiple foci, right or left.

Waves large, wide, notched.

(a) Premature beats.
(b) Ventricular escape.
(c) Idioventricular rhythm.
(d) Ventricular tachycardia, paroxysmal.
(e) Ventricular flutter (rare).
(f) Ventricular fibrillation (commonly terminal).

C. Large Q Wave (amplitude 25 per cent of main deflection). Frequently found in Lead III as evidence of arteriosclerotic heart changes, usually with anginal syndrome.

5. *The T Wave*

Important features are size, direction and contour. Normal amplitude 5 mm.

(a) Small T may indicate myocardial disease, poor nutrition, weak contraction.

(b) Large T is often associated with bundle branch block and ventricular premature beats. Otherwise may indicate strongly contracting ventricle, e.g., acute thyrotoxicosis.

(c) Inversion (in Lead III, T is normally downward in 30 per cent).

Usually associated with abnormal QRS (intraventricular block, premature beats, ventricular predominance). May occur in toxic states, in uremia, after digitalis, quinidine, or morphine.

Upward convexity of S-T interval, associated with inverted T, is pathognomonic of myocardial ischemia. Chiefly found after coronary thrombosis (occasionally in acute pericarditis with effusion and during anginal attacks).

SUMMARY

At a dinner in this city a few years ago the late J. B. Deaver remarked that he had noticed that when the electrocardiograph was brought in the patient usually died within a day or two. To refute this point of view only a glance is necessary at the foregoing tabulation and the great variety of physiological disorders which the electrocardiogram reveals. It is another Philadelphia surgeon, DaCosta, who has said that diagnosis by intuition is an easy way to a wrong conclusion.

No physician whose clinical experience goes back even a decade can fail to appreciate the light that electrocardiography has shed on coronary thrombosis. "Acute indigestion," "ptomaine poisoning," pleurisy, gall stones, stomach ulcer, to say nothing of "angina pectoris" are instances of "diagnosis by intuition" which I have personally encountered. The same is true of the arrhythmias. Auricular flutter in one young woman was accompanied by vomiting for which the surgeon was called in, by tachycardia and nervousness for which the neurologist was consulted, and by the signs of exhaustion for which the help of the internist was sought. A record solved the diagnostic problem and pointed the way to prompt and effective treatment. Between bradycardia and heart block, between numerous premature beats and auricular fibrillation, between a symptom-rich neurosis and an obscure but serious myocardial impairment, the electrocardiogram often provides the evidence that makes the diagnosis clear and the treatment precise. It must be granted that upon such clarity and precision often hinges the question of whether the patient becomes an invalid without cause or runs great risks without need. With full allowance for the limitations of the method in respect to the requirements of cardiac diagnosis which were set forth at the outset, "it may justly be said now," as White states in his recent book, "that a cardiovascular examination is not complete without an electrocardiogram."

THE PRACTICAL ASPECTS OF PENTOSURIA*

With Report of Four Cases

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In presenting this rather brief discussion of pentosuria, I do not propose to bring any strikingly new facts to your attention. My purpose is to recall this interesting condition to your mind and to focus your attention upon what practical value its diagnosis may have to all of us.

The term pentosuria refers to a condition in which there is present in the urine a substance that reduces copper and gives a reaction which cannot be distinguished from that of glucose. This reaction is obtained with such standard reagents as Fehling's, Benedict's or Nylander's solutions. It is further characterized by a normal blood sugar content after a 12 hour fast and after the ingestion of a large quantity of glucose, the latter referring to the glucose tolerance test. This phenomenon is described by Garrod as one of the "inborn errors of metabolism." He classified it with such conditions as cystinuria and alkaptonuria and stated that it may occur in several members of the same family, most often in brothers and sisters whose parents do not share their peculiarity and whose children also are immune. He further cited the preponderance of such anomalies of metabolism in males. This particular anomaly is mainly found in the Jewish race.

The outstanding feature of the disease is the presence in the urine of "sugar" which is not glucose but pentose. It bears a striking resemblance to renal glycosuria in that both conditions present a condition in which "sugar" is present more or less continuously in the urine and in which the blood sugar findings are constantly normal. Both are apparently harmless and neither passes over into true diabetes. Jones and Sussman found less than 100 cases recorded in the literature up to 1927 and a subsequent search by the writer has revealed very few additional cases. In view of our present knowledge, there must unquestionably have been many more.

Pentosuria is generally recognized in two clinical types. One is the alimentary form of pentosuria in which the pentose in the urine is derived from the pentosans of the food. Such foods are especially cherries, pears, blackberries, strawberries, prunes, grapes, wine and beer. The excretion of pentose in the urine is abolished when these substances are removed from the diet. There can be but little doubt that many cases of so-called alimentary glycosuria are really alimentary pentosuria. The other type is the chronic essential pentosuria in which there is a practically continuous excretion of pentose in the urine. The latter is entirely independent of the diet and will in fact continue on a starvation diet. Essential chronic pentosuria is a comparatively rare disease.

The pentoses are carbohydrates which contain 5 carbon atoms ($C_5H_{10}O_5$). The pentose of chronic pentosuria is evidently endogenous in character and its origin has aroused much speculation, although up to the present time it is quite unknown. It has been suggested that it arises from the nucleic acid of the nucleo-proteins, but this origin has not been established.

Chronic pentosuria produces no symptoms, but it is of clinical interest and importance because the urine has reducing properties which may lead to a fallacious diagnosis of diabetes mellitus. A variety of reducing substances is demonstrable in the human urine. The followlowing 6 sugars are to be especially remembered:

MONOSACCHARIDS
1. Pentoses ($C_5H_{10}O_5$); Ribose, Arabinose, Xylose
   Hexoses ($C_6H_{12}O_6$)
2. Glucose
3. Galactose
4. Levulose

DISACCHARIDS ($C_{12}H_{22}O_{11}$)
5. Lactose
6. Maltose

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* Read before the Society April 24, 1929.

Since there are no clinical symptoms, it becomes necessary to make a diagnosis of this condition in the laboratory. This is accomplished by the combined examination of the urine and the blood.

The blood sugar in the basal state (after a 12 hour fast) is normal and should average between 80 and 120 milligrams per 100 cc. Following the ingestion of 100 grams of glucose, a maximum concentration is reached in 1 hour and the original basal concentration is reached in 3 hours. There is no diminished sugar tolerance. All these values correspond to the normal.

To differentiate pentosuria by urine examination, the following procedures will be of material assistance:

1. The fermentation test with baker's yeast was thought to differentiate glucose from other sugars, but this has been disproved. For absolute identification, the mycologic method of Castellani and Taylor is recommended.

2. Bial's modification of the orcine test yields a greenish precipitate and a greenish supernatant fluid with pentose. Garrod believes this gives a clearcut differentiation of pentose, but Jones and Sussman have found a pseudoreaction with dextrose.

3. A. Neuman devised a modification of the orcine test which produces distinctive colors and spectra with dextrose and pentose.

4. The phloroglucinol test produces a red color with pentose.

5. The urine of most cases of pentosuria is optically inactive. Very occasionally it is dextrarotary.

6. With the phenylhydrazin test, a crystalline osazone is obtained which is difficult to differentiate from that of glucosazone. However, the melting point of the crystals after recrystallization is a most important distinguishing point. The melting point of glucosazone is 205°C and that of pentosazone is 156°C to 160°C. The theoretical nitrogen content of pentosazone is 17.07 per cent. This estimation completely insures the nature of the crystals.

7. McCance has been able to simplify the quantitative estimation of pentose. In this method the pentose is converted to furfural by boiling with hydrochloric acid.

The delayed reduction of Fehling's solution, frequently mentioned in textbooks as being diagnostic of pentose, is not necessarily due to this substance and is therefore not reliable for this purpose. Garrod points out that urines containing small traces of glucose or those preserved with toluene or chloroform may give a similar delayed reduction.

In pentosuria the utilization of carbohydrates is in no way impaired. The respiratory quotient is normal.

The correct diagnosis of these comparatively rare cases is of course important from the purely academic standpoint. The ultimate object of all diagnostic studies is to reach a logical and correct diagnosis. The employment of all the means at our command is imperative so that the case may be placed in its proper category and finally receive the appropriate treatment. This can only be accomplished by the application of modern scientific methods.

From the truly practical side of medicine, the correct diagnosis of pentosuria can be considered under several heads. The modern physician is recognizing more and more the importance of seriously considering the psychic state of his patient. The average human being is especially in fear of contracting one of the various serious chronic diseases, and in many cases this dread in itself amounts to a real neurosis. Most important of these diseases striking terror in the minds of the laity are cancer, syphilis, heart disease and diabetes. It becomes a matter of real responsibility to the physician to make even a tentative diagnosis of one of these more serious diseases. Every precaution should be taken to absolutely establish the correctness of the diagnosis before discussing it with the patient. Once the suggestion of such a diagnosis is made to the patient, it frequently becomes impossible to convince him that such is not the case, and the individual lives in constant fear. A mental scar is created that it is well-nigh impossible to eradicate. This applies in particular to the diagnosis of diabetes. As pentosuria may be confused with diabetes when only routine urine examinations are relied upon, it becomes apparent that the accurate diagnosis of pentosuria is extremely important.

From the practical standpoint this condition requires no treatment. Diet does not seem to play any rôle in the essential type of pentosuria and it is absolutely unnecessary to restrict the diet. In fact, such restriction is contraindicated as it again reduces the morale of the patient by suggestion of some serious metabolic disturbance. Also, any limitation of diet may actually interfere with the physical well-being of the patient. The introduction of insulin in the treatment of diabetes has further complicated the situation This epoch-making remedy is a two edged sword, potent for good and for evil. The latter statement refers to the use of insulin in cases of "glycosuria" which are not true diabetes, such as pentosuria. In view of the danger of hypoglycemic shock as the result of the unnecessary use of insulin, it becomes a matter of more than theoretical importance to determine the exact nature of the reducing substance in the urine of a patient suspected of having diabetes. It need hardly be emphasized again that the presence of a copper reducing substance in the urine is not sufficient for a diagnosis of diabetes.

An important sidelight of the economic importance of a correct diagnosis is the question of life insurance. Formerly regarded as a luxury, life insurance is now generally regarded as one of the modern economic necessities. It is only within the past few years that it has been possible to obtain insurance for these patients having "sugar" in the urine. They were all regarded as diabetics and as such were not insurable. More recently they have been accepted as substandard risks if proven to be non-diabetic by careful examination. Even more recently it has been possible to convince a few of the hardheaded medical directors that pentosuria was an entirely harmless condition, and a few cases of essential pentosuria have been accepted as normal risks at the regular rates of insurance. This marks a great step forward in the recognition of the large insurance companies of the application of modern scientific medicine to one of our great economic problems.

CASE HISTORIES

Case 1. E. S., male, aged 3 years. The patient was a normal, well developed child. No brothers or sisters. Parents living and in good health. During a routine examination "sugar" was found in the urine. "Sugar" constantly present. Blood sugar repeatedly normal. Glucose tolerance test normal. (See table.) Reducing substance in urine (sugar) found to be pentose. Physical examination normal. Urine examination normal with exception of reducing substance. Wassermann negative. Blood count: Hemoglobin 90 per cent (Dare); R. B. C., 4,800,000; W. B. C., 9,900. No clinical symptoms. No dietary restrictions imposed. Patient under observation for subsequent 4 years with blood sugar determinations occasionally. All normal. Pentose constantly present in the urine. Growth and development continued to be normal. Diagnosis: Chronic essential pentosuria.

*Glucose Tolerance Test**

	CASES	AGE	FASTING BLOOD SUGAR	BLOOD SUGAR 30 MINUTES	BLOOD SUGAR 60 MINUTES	BLOOD SUGAR 120 MINUTES	BLOOD SUGAR 180 MINUTES
		yrs.					
1	E. S.	3	100	124	176	120	90
2	B. J. B.	17	76	120	178	117	84
3	B. W. W.	36	118	140	195	148	96
4	N. S. W.	68	109	140	180	116	100

* 100 grams glucose ingested on fasting stomach. Blood sugar values in milligrams per 100 cc. All of the above glucose tolerance curves are normal.

Case 2. B. J. B., male, aged 17 years. The patient presented himself for examination subsequent to a declination for life insurance. The reason was the presence of "sugar" in the urine. This observation was confirmed. Urine otherwise normal. Blood sugar normal. Glucose tolerance test normal. (See table.) "Sugar" in urine found to be pentose. Wassermann negative. Blood count: Hemoglobin 88 per cent (Dare); R. B. C., 4,950,000; W. B. C., 7,600. Physical examination normal. No clinical symptoms. No dietary restrictions imposed, with the exception of foods rich in pentosans. This restriction did not inhibit the excretion of pentose and was therefore discontinued. One brother was examined for evidence of pentosuria. None found. Both parents living and in good health. Patient under observation for 3 years with occasional blood sugar determinations. All normal. Pentose constantly present in the urine. No symptom or signs developed. Diagnosis: Chronic essential pentosuria.

Case 3. B. W. W., male, aged 36 years. This patient came under observation 12 years ago with the statement that he had been refused life insurance. This was due to finding "sugar" in the urine. This finding was confirmed. Blood sugar was normal. Glucose tolerance test was normal. (See table.) The "sugar" in the urine continued in spite of a rigid diet. A diagnosis of renal glycosuria was made. This diagnosis was confirmed by a study in one of the leading clinics of another city. The patient was examined again 6 years later. The same laboratory findings were present. At this time however the "sugar" in the urine was found to be pentose. Urine otherwise normal. Wassermann negative. Blood count: Hemoglobin 72 per cent (Dare); R. B. C., 3,990,000; W. B. C., 8,100. There was 1 brother who was well and did not have pentosuria. One sister was well and upon investigation was found to have pentosuria. Her case is not included as it has been reported elsewhere. Both parents living and well. No dietary restrictions imposed, with the exception of foods rich in pentosans. This did not influence the excretion of pentose and was discontinued. After 6 years of observations the condition remains the same. Repeated blood sugar determinations are normal, and pentose is constantly present in the urine. No physical signs or symptoms have appeared. Diagnosis: Chronic essential pentosuria. In this case a large life insurance policy was finally issued at a normal standard rate.

Case 4. N. S. W., male, aged 68 years. The patient presented himself for treatment for coryza with the statement that he had pentosuria. "Sugar" had been found in his urine 27 years previously and had been present constantly irrespective of diet. He was told that he had a mild harmless diabetes. Until 8 years ago he had been on a restricted diet. At that time it was discovered that the sugar in the urine was pentose, not glucose. Since then he has been on a regular diet. Reexamination confirmed the fact that the sugar was pentose. The blood sugar was normal and the glucose tolerance test was normal. (See table.) The urine in addition to pentose contained a slight trace of albumin and a few hyaline casts. Other blood examinations and Wassermann negative. Nonprotein nitrogen, 38 mgms., creatinin, 1.3 mgms. per 100 c.c. Blood count: Hemoglobin, 82 per cent (Dare); R. B. C., 4,210,000; W. B. C., 8,600. The family history is not exact as one sister and both parents were dead. All died of cardiac disease and none had sugar in the urine, according to the patient. This patient was not observed again as he was from another city.

Summary and Conclusions

Four cases of chronic essential pentosuria are presented. All are males of the Jewish race. The ages vary from 3 to 68 years. All show a normal glucose tolerance curve. Over a period of observation varying from 3 to 27 years no case has shown any clinical symptoms related to the pentosuria and there has been nothing to suggest a change to true diabetes. A familial condition is present in 1 case. This small series would, therefore, corroborate the generally held opinion that this disease is harmless, is not affected by diet and constitutes an "inborn error of metabolism."

The following points regarding pentosuria are worthy of emphasis:

1. The necessity of careful chemical investigation of the urine and the blood in cases with "sugar" in the urine is important before making a diagnosis of diabetes and administering insulin.
2. Individuals with pentosuria should not be subjected to a restricted diet nor should they be classed as sub-standard insurance risks.
3. They present a type of hereditary anomaly which is essentially harmless when treated as such.
4. Pentosuria presents the interesting problem of the exact nature of this metabolic disorder. In essential pentosuria the excreted pentose varies within very narrow limits. Garrod assumes that the uniformity of the excretion is due to the failure of the body to utilize some definite part of the metabolized protein.
5. Again the important triad of a careful history, physical examination and laboratory study becomes the keynote of accurate diagnosis.

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A REVIEW OF THIRTY-ONE CASES OF FOREIGN BODY OF THE AIR AND FOOD PASSAGES*

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Before reviewing this small series of cases of foreign bodies of the air and food passages, it may be well to briefly recall a few general considerations of the subject since the occurrence of obstruction of these passages by foreign bodies is probably more frequent than one is lead to believe. This is borne out by the fact that during the past year two cases have been brought to my attention in which autopsies in local hospitals revealed the cause of fatal pulmonary suppuration to have been due to unsuspected foreign bodies in the bronchi.

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* Read before the Society February 10, 1932.

Etiology

It has been demonstrated that a very large percentage of inhaled or swallowed foreign bodies is the result of carelessness. Most of these cases occur in children who have been allowed to play with small objects capable of being inhaled or swallowed. A very frequent cause is sneezing, coughing or laughing with some foreign object in the mouth. A large number of esophageal cases occur in adults, particularly those wearing artificial dentures, and are caused by attempting to swallow large mouthfuls of improperly masticated food. Often the first indication of benign stricture or of new growth in the esophagus is the lodging of food above the obstruction.

Site of Lodgment

In the esophagus the favorite site of arrest is the area in the cervical portion of the esophagus just below the level of the cricoid cartilage. A physiological narrowing is present at this level, produced in part by muscular contraction, but mainly by the crowding of the adjacent viscera into the fixed and narrow upper thoracic aperture. As a rule, if dislodged from the cervical esophagus they either lodge at the diaphragmatic hiatus or pass into the stomach. In the airway the favorite site of lodgment is the right main bronchus. This bronchus is much more in a straight line with the trachea, the situation of the carina is to the left of the midline of the trachea, and a greater volume of air passes through it on inspiration. However, the intruding object may remain in the larynx or trachea, or may pass into the left lung. Foreign bodies frequently change from one position to another in the tracheo-bronchial tree, giving rise to changeable symptoms and signs. The tendency is for them to become placed lower when they move from one place to another.

Symptoms

The symptoms are necessarily as varied as the number of places in which foreign bodies are capable of lodging. If in the esophagus, there is usually a history of choking or gagging while some foreign object was present in the mouth. This is often followed by a subjective sense of fullness in the throat. Swallowing then becomes more difficult if the object stops in the upper esophagus. Solids will usually not pass and liquids only with difficulty. If the object has sharp edges any attempt at swallowing may be extremely painful with the result that saliva dribbles from the mouth instead of being swallowed. It is extremely important to bear in mind that foreign bodies in the esophagus may produce marked respiratory symptoms, such as cough, embarrassed respiration and even cyanosis. These symptoms may be produced by pressure on the trachea or by the overflowing of secretions into the larynx during attempts to swallow. If the obstruction be lower down in the esophagus regurgitation often takes place.

If the foreign body is in the larynx or tracheobronchial tree the initial symptoms are almost always choking, gagging, coughing and wheezing, often followed by a symptomless interval. Cyanosis is not uncommon and asphyxia may terminate the case in the initial stage. During the passage of the foreign body through the larynx there is almost always present this chain of symptoms of laryngeal spasm. If this is noted in the history it is very important, but a negative history is not conclusive. If the object lodges in the larynx the symptoms are usually very noticeable. Hoarseness, croupy cough, aphonia, wheezing and cyanosis are marked. If it passes through the larynx and down into the trachea it may remain there or pass into either of the two main bronchi or their sub-divisions. If its size precludes entrance into the bronchi it may remain in the trachea or at the entrance of either of the main stem bronchi. If loose in the trachea, cough, hoarseness, wheezing and cyanosis, are usually present. The audible slap described by McCrae and heard at the mouth is usually pathognomonic of tracheal foreign body.

When the object is small enough to enter the bronchi symptoms relative to the area supplied by that bronchus will be present. It should be borne in mind that after the initial symptoms of laryngeal spasm have passed inorganic foreign bodies may become fixed in one place in the trachea or bronchi and produce no symptoms if they are not large enough to obstruct the flow of air through the particular tube in which they are located. On the other hand, vegetable foreign bodies produce rather quickly a very severe tracheo-bronchitis. Peanuts, particularly, produce a violent inflammatory reaction in the mucosa. If the object becomes lodged in a bronchus it will produce symptoms referable to the area supplied by this tube. When it first lodges it may not be large enough to completely obstruct the inflow of air but may impair expiration. This gives rise to an obstructive emphysema. Later the inflammation produced by the presence of the body may close off even the inspired air and result in atelectasis of the affected area. For this reason x-ray examination is a very valuable aid in the diagnosis even if the object is not opaque.

Physical Signs

These vary with the condition present in different cases and at different times in the same case. In bronchial foreign bodies, limited expansion, decreased vocal fremitus, impaired percussion note and diminished breath sounds usually occur distal to the obstruction. With small inorganic substances decreased expansion may be the only physical sign. Of all aids in diagnosis x-ray is surely the most valuable. Areas of emphysema or atelectasis often allow one to locate even non-opaque objects. In the esophagus x-ray is about the only means of localization possible. Here again non-opaque objects may be located by the use of barium in fluid mixtures, paste and capsules.

Treatment

Treatment is essentially removal by endoscopy. This procedure is almost always carried out under local anesthesia or even without an anesthetic of any kind.

Prognosis

In a general way it may be said that foreign bodies in the trachea, bronchi and esophagus, if allowed to remain indefinitely, usually prove fatal. Only 2 to 4 per cent of bronchial foreign bodies are coughed up. After bronchoscopic removal patients get well in about 98 per cent of cases, even if removal occurs after extensive pathological changes from prolonged lodgement have taken place. This is in marked contrast to lung suppuration of other etiology.

The following typical cases which bring out the most important points in diagnosis have been selected as illustrative:

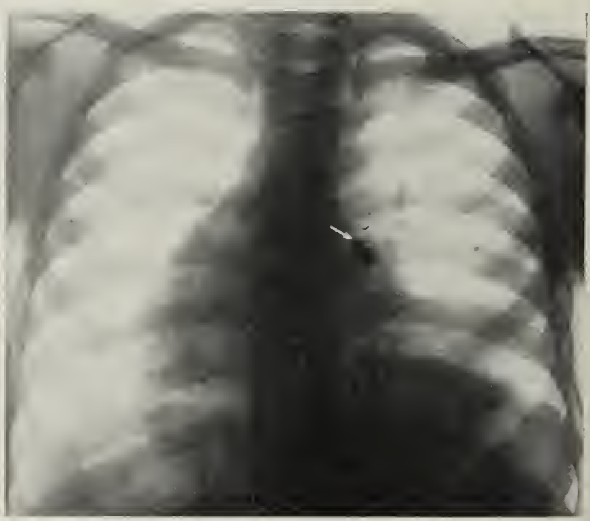

Fig. 1. Case 1. Tin Whistle in Right Middle Lobe Bronchus of Boy 8 Years of Age

Case Reports

Case 1. A white, male child, 8 years of age, was admitted to Children's Hospital June 15, 1928, with the following history: About 3 weeks ago a tin whistle was swallowed and a choking spell ensued. This passed off and the child seemed to be in such good condition that no further attention was paid to it. During the past week he has been troubled with a rather persistent cough. Examination of the chest was not noted on the chart, but on the slip requesting x-ray examination there was a clinical diagnosis of "bronchitis and swallowed foreign body." X-ray report on the chest was as follows: "There is a metallic foreign body, 5 by 11 mm., lying in the bronchus of the middle lobe on the right side. The rounded end of the foreign body is upward. There is slight atelectasis of the middle lobe and the diaphragm is elevated on the right." (Fig. 1.) With the use of a very little 10 per cent cocaine solution a 5 mm. bronchoscope was passed into the right main bronchus and the foreign body seen to be protruding from the middle lobe bronchus. Since it was more or less flat some air was passing into the lobe on each side. It was grasped with side-curved forceps and removed without difficulty. On examination it proved to be the end of a whistle. There were 2 metallic plates surrounded by rubber. X-ray the next day showed "The lung fields to be clear." The patient had very little general or local reaction and was discharged in 3 days.

Case 2. A white, male infant, 10 months of age, was admitted to Children's Hospital January 2, 1930. The past history and family history were negative. At 7o'clock in the morning, or about 12 hours before admission to hospital, the mother was called to the telephone just as she had finished the baby's morning bath. On returning a few minutes later, much to her alarm, she found the child choking. After the first spasm had passed regular breathing was reëstablished, but a decided wheezing sound accompanied respiration. The mother very sensibly began to search for any nearby objects which the child might have reached. The only loose objects present were an open bottle of rubbing fluid and the cork which in her hurried exit she had not put back in the bottle. On close examination of these objects she noticed that a small portion of the upper rim of the cork was missing. She was unable to recall whether or not it had been that way when she last saw it. The local physician was called in and made an examination of the chest. At this time the breath sounds were normal and there was no excessive coughing, so that the conclusion was reached that while a foreign body might have been in the throat it had probably safely passed into the esophagus. The mother was warned that a foreign body might be present and to watch for and report any further signs of embarrassed respiration or coughing. During the course of the day there was no diminution in the wheezing and the child was brought to town, x-rayed and admitted to Children's Hospital where I first saw him. After admission to the hospital a very careful examination of the chest was made. Respiration was free but still accompanied by a slight wheezing sound. There were no râles or areas of diminished breath sounds, and there was no audible slap. As far as could be made out by auscultation air came freely into all parts of both lungs. The only variation from normal was a slightly diminished expansion of the right side. This diminution was so slight that it probably passed unnoticed except for the history of possible foreign body. The only other abnormality was a faint appearance of cyanosis in the lips. During the half hour or more consumed by the examination and consultation, no cough was present Report of the x-ray examination was as follows: "Examination of the chest and abdomen shows no shadow of a foreign body. There is no sign of obstructive emphysema or other evidence of a non-opaque foreign body in the respiratory tract." To sum up, then, we were confronted with a tiny patient 10 months old who had a very definite history of foreign body inhalation; there was a definite history of temporary strangling followed by free breathing accompanied by a marked wheeze. On the other hand, the mother knew of no object which had been within the child's reach except the bottle and cork. A piece which was missing from the cork might or might not have been chipped off at the time of the accident. To further obscure the diagnosis, the child was suffering from cold, and the possibility of an acute laryngotracheitis producing the wheeze had to be considered. The only physical signs were a very slight diminution of expansion of the right chest and a rather questionable cyanotic condition of the mucous membrane. It was felt that of all these points the very clear, intelligent history given by the mother was the most important. She stated very definitely that there had been present no sign of wheezing before the attack of strangulation and that it had made its appearance immediately following the attack. Hence a tentative diagnosis of foreign body was made and exploratory bronchoscopy advised. Without the use of local or general anesthetic a 3 mm. bronchoscope was introduced into the trachea which was seen to be inflamed and contained more than the normal amount of secretion. As the instrument was passed down the trachea the foreign body was encountered on the carina partly impinged in the right main bronchus. With the use of a very small side-curved forceps it was grasped and removed. Upon examination it was found to be a piece of cork about 3 mm. wide by 9 mm. long. The wheezing sound immediately ceased and patient returned to room in good condition. The next day the rectal temperature rose to 102.4°F but there was no other untoward symptom. The cold had become worse but the breathing was normal. On the second day the patient was discharged from the hospital, having made an uneventful recovery.

Case 3. A colored, male child, 5 years of age, was admitted to Children's Hospital May 14, 1930. Eleven days before admission to hospital patient had choked while playing with some buttons. After the initial spasm had passed he began to breathe more easily but there was still present some cough. During the previous few days he had coughed more frequently and had had considerable shortness of breath on slight exertion. He could swallow food without difficulty but the appetite was poor. The only notation made on his chart of the examination of the chest was the admission note in which it is stated merely that the chest was resonant but that there was a diminution of breath sounds on the right side. Report of the x-ray examination was as follows: "There is an opaque foreign body 15 mm. in diameter in the right primary bronchus. This is collapsing the lung, causing compensatory emphysema on the left side." The next day, without anesthesia a 5 mm. bronchoscope was passed into the trachea. Immediately a foreign body, pink in color, appeared protruding from the right main bronchus. The presenting portion was cone-shaped, the proximal portion being the apex through which there was a round perforation. It was tightly impinged in the bronchus. Side-curved forceps were introduced and the object grasped, but it was so tightly wedged that the blades slipped off of the smooth, receding surface. A pair of very small forceps were next used. One blade was introduced into the central opening and the other blade engaged outside. With this grasp the forceps held and the object was brought up into the trachea and through the cords without difficulty. It proved to be a glass bead about 15 by 5 mm. with cone-shaped ends. Fortunately the perforation was through the long axis so that the forceps blade could be introduced into the opening. During the following 24 hours breathing was much easier and the cough cleared up. Patient was discharged the second day in good condition.

Case 4. A white, male infant, aged 11 months, was admitted to Sibley Hospital February 25, 1931. Several hours before admission this infant had swallowed a safety pin. There was some choking and cough at first but this passed off and on admission the infant was apparently comfortable. X-ray examination revealed an open safety pin, point up, lodged in the lower part of the esophagus (Fig. 2). A 5 mm, esophagoscope was passed into the esophagus, but nothing abnormal was encountered until the cardiac end of the stomach was reached, when the keeper of the pin was seen just as it passed into the stomach where it became lost to view. Immediate x-ray showed that it was now in the stomach (Fig. 3). It had evidently been dislodged during the passage of the esophagoscope (Fig. 4). The baby was kept in hospital on its usual diet. No cathartic was given, but daily x-ray examination was made. It passed uneventfully through the intestines.

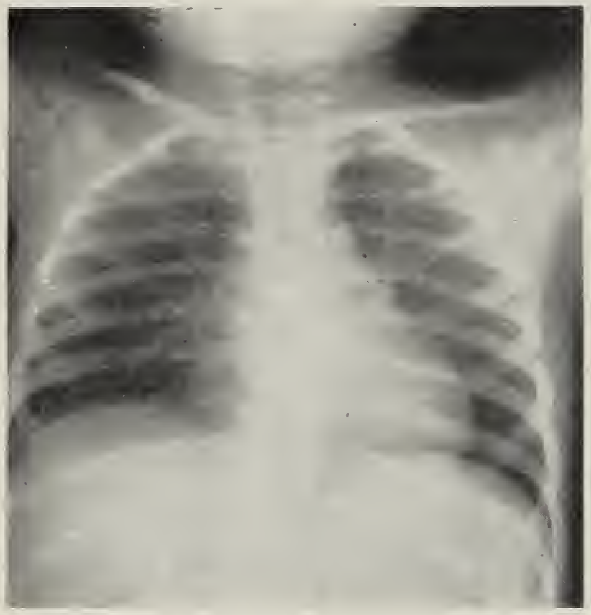

Fig. 2. Case 4. Safety Pin in Esophagus of Child 11 Months Old

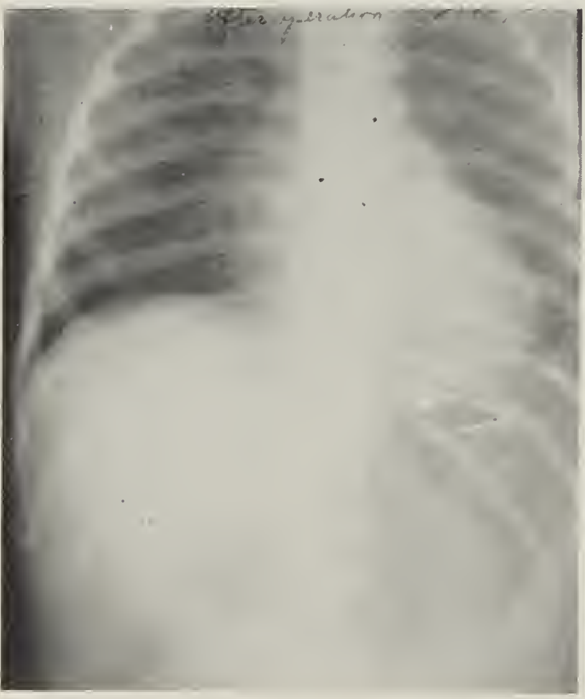

Fig. 3. Case 4. Pin in Stomach

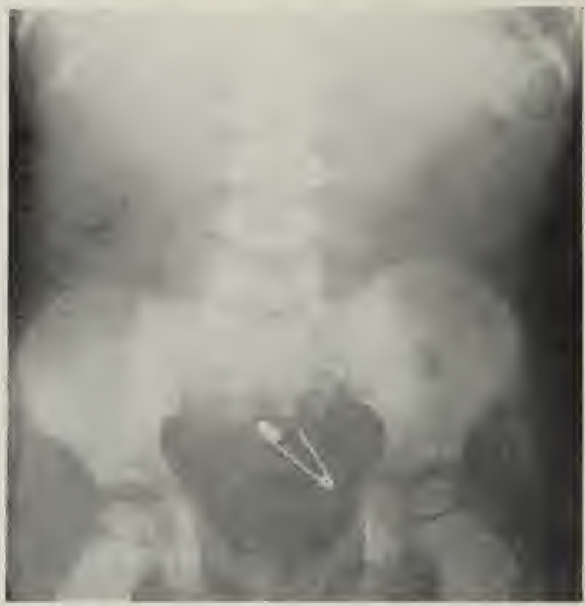

Fig. 4. Case 4. Pin Just Before Being Passed

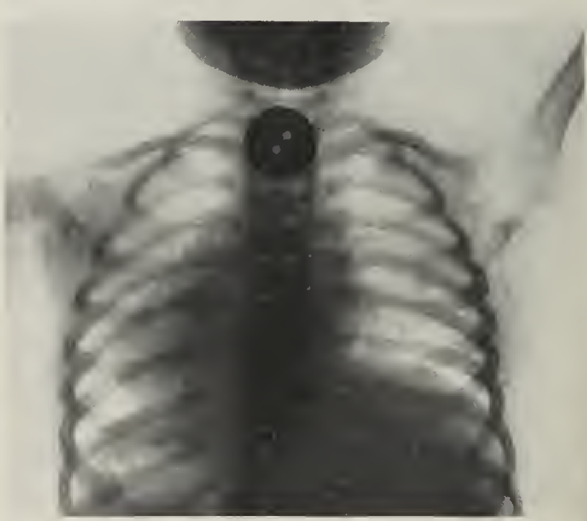

Fig. 5. Case 5. Button in Esophagus of Child 3 Years Old Producing Marked Respiratory Symptoms

Case 5. A white, female child, 3 years old, was admitted to Episcopal Hospital May 19, 1931. Several hours before she had been playing with some buttons. Her mother heard her cry out and came in the room to find her gagging and very short of breath. She was turned upside down and pounded on the back. Since the initial attack she had had difficulty in breathing and coughed constantly. There was some cyanosis noted in the fingers and conjunctiva. Saliva dribbled from the mouth. X-ray examination showed a button lodged in the upper esophagus (Fig. 5). She was immediately taken to the operating room and the botton removed with an esophageal speculum and grasping forceps. Embarrassed respiration was relieved and the patient was discharged the same afternoon. This case illustrates the marked respiratory embarrassment often produced by large esophageal foreign bodies.

Case 6. A white, female child, aged 3 years, was referred July 18, 1931, with the following history: During the day she had been playing and had suddenly choked. After the spasm passed she had no further symptoms but cough. This had persisted. A diagnosis was made of obstruction of the right lung probably caused by the inhalation of a foreign body. The mother stated that the child had been playing with a medicine dropper which she could not find later and she feared she had inhaled a broken part of it. X-ray examination showed a cylindrical foreign body obstructing the right main bronchus (Fig. 6). She was taken to the operating room and a 4 mm. bronchoscope passed into the right bronchus where a foreign body was discovered tightly wedged into the bronchus. It was grasped and removed without difficulty. It proved to be the metal case of an exploded 22 short cartridge. She was discharged the following day with the lungs in normal condition.

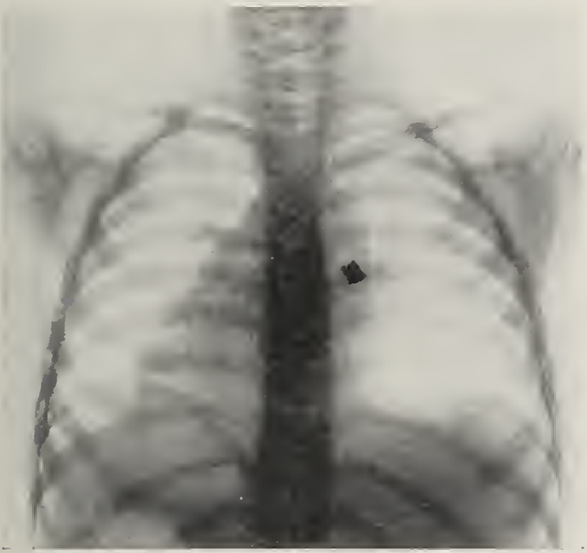

Fig. 6. Case 6. Cartridge in Right Bronchus of Child 3 Years Old

Summary of Cases

In this group of 31 cases the following results were obtained: One refused to have esophagoscope passed; 1 refused further operating after failure of first attempt and was removed to Philadelphia where the foreign body was successfully removed; 7 were relieved of symptoms by having the foreign body dislodged during introduction of instrument so that it could pass normally by rectum; 22 were successfully removed by endoscopy with relief of symptoms. There was no mortality.

Conclusions

In reviewing this small number of cases, several points are worthy of special emphasis:

1. One cannot be too careful in seriously studying any case in which there is a history of the possibility of foreign body inhalation. A history of sudden strangling, particularly in children, whether or not it is followed by embarrassed respiration, dysphagia or cough, should always be followed up. Unless one is on guard about this condition, the history, often very clearly given, is apt to be disregarded as an ungrounded fear of an over-anxious mother.

2. Most foreign bodies that pass into the stomach will pass through the intestinal tract without any deleterious effect. However, if sharp, they should be watched by daily x-ray. At the Jackson Clinic it is felt that if the object becomes lodged in one place for 4 days surgical interference should be advised. The patient should be kept on his normal diet. The use of cathartics and large amounts of roughage often given tend to increase peristalsis with the consequent grave danger of perforation.

3. After the object has passed into the trachea or bronchi and has become fixed in position an inorganic foreign body is very well borne by the mucous membrane and if not causing cough for quite a while it may lull one into a sense of false security.

4. It is quite possible for the object to be so placed that a fair amount of air passes around it with the consequent aeration of both lungs. For this reason both clinical examination and x-ray

may not be diagnostic. In such case a lessened lung expansion is very significant.

5. If there is a suspicious history and examination is negative one of two courses should be followed. If the history is rather indefinite or if it is believed that it points to some semi-solid material capable of being coughed up, further clinical observation may be safely advised. On the other hand exploratory bronchoscopy should always be done if the history is rather definite, more especially if the object is thought to be organic in origin, such as kernels of corn, peas, peanuts, etc., because these very quickly produce an extremely severe tracheo-bronchitis which endangers the life of young children and makes their bronchoscopic removal much more difficult.

6. Foreign bodies lodged in the esophagus frequently produce marked respiratory symptoms either by compression of the trachea or by the overflow of secretions into the larynx during attempts to swallow. Hence it is of the utmost importance to carefully examine both the airway and esophagus when there is any doubt as to the location of the obstructing material.

7. If there is no immediate danger of death by strangulation, these cases should be carefully and systematically studied, and prepared for operation before any attempt at removal is made.

THE DIAGNOSIS AND TREATMENT OF CANCER OF THE LARYNX*

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The intrinsic forms of laryngeal cancer are much more common than the extrinsic forms. The majority of the intrinsic cases have their beginning on the anterior half of the vocal cord; occasionally they may originate in the ventricles or ventricular bands. The extrinsic type originates from the epiglottis, aryepiglottic folds, pyriform sinus and posterior surface of the cricoid ring. The percentage of early diagnosis in both is extremely low, especially so in the intrinsic type, mainly for two reasons: first, failure of medical men in general to realize the importance of a careful laryngoscopic examination in all cases of persistent hoarseness, an early and invariable symptom of intrinsic cancer; second, failure of patients having hoarseness to seek medical advice early.

Out of 192 cases of laryngeal cancer, which I have seen in the Radiological Department of the Philadelphia General Hospital, only 2 were early cases and about 90 per cent were hopeless. In 100 advanced cases, we found that the average time from beginning of hoarseness until the diagnosis was made, was 11½ months, and practically all had been treated for chronic laryngitis without a mirror examination of the larynx having been made. Every larynx can be visualized and should be in all cases of hoarseness. McBride has well said, "that the early diagnosis of laryngeal cancer is a pearl of great price in the treatment of this disease."

Diagnosis of Intrinsic Cancer

There is a fairly large list of endolaryngeal conditions with which cancer of the larynx may be confused, of which tuberculosis and syphilis are the outstanding. One should always remember that cancer may co-exist with syphilis and tuberculosis of the larynx or that it may develop in a syphilitic patient or one known to have pulmonary tuberculosis. There are cases on record in which the three lesions have occurred simultaneously in the same larynx.

The history, signs and symptoms should always be carefully studied and frequent examinations of the larynx may be required. In a patient past the age of forty with chronic hoarseness and in whom on mirror examination there is found on the anterior half of a vocal cord an infiltrating lesion, wart-like in appearance, ulcerated, with a zone of hyperemia around its base and associated with some impairment in the mobility of the cord, one may at once conclude that it is probably an epithelioma.

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* Read before the Society under the auspices of the Section on Ophthalmology and Otolaryngology, February 24, 1932.

One should not be satisfied, however, with this cursory examination alone. Instead, he should follow a routine procedure such as is followed in all competent clinics and by careful laryngologists. A complete history is enlightening and a thorough indirect examination of the larynx is always imperative. This is to be followed by a meticulous physical examination, which should include serological studies, bacteriological examination and roentgenograms of the chest. One is then confronted with the much disputed question as to the advisability of a biopsy. There are instances, perhaps, in far advanced cases, in which one from long experience of many closely observed cases can rely upon his clinical judgment for a diagnosis, but in early intrinsic cases no one should depend upon mirror examination alone for a positive diagnosis, since grave errors have been made by so doing; nor should one place absolute reliance upon a biopsy report, since even the best pathologists make mistakes. However, the cooperation of an accomplished pathologist experienced in the study of neoplastic tissue is indispensable.

In order to place confidence in a histological report, two features are esssential: first, the laryngologist must remove an adequate amount of tissue for a comprehensive study; second, the tissue must be properly prepared and carefully studied by a competent pathologist. I believe that I cannot place too great an emphasis on these two essentials. I have found it necessary to open the larynx in order to fully visualize the growth and to remove a sufficient amount of tissue before being able to make a definite diagnosis. Those who oppose biopsy as a means of diagnosis believe that this procedure increases the rapidity of the growth to such an extent that it lessens the chances of its complete removal This has not occurred in may experience, as proved by histological studies of several larynxes after removal. I do believe, however, that before removing a piece for study it is wise to secure the consent of the patient to proceed with any operative measures that may be deemed best suited, immediately following the pathological report. In order, therefore, to be fairly sure of the diagnosis one must correlate the clinical findings with those of the pathologist.

Treatment of Early Intrinsic Cancer

Adequate exposure with complete surgical excision of the growth is still the method of choice of most laryngologists. Endolaryngeal removal and the method of window resection have both been successfully used and still have their advocates, but they have not the sound surgical principles that should be applied in the treatment of malignant disease and are not to be recommended. Radium and X-ray therapy have been successful in an increasing number of early cases, but as yet no form of treatment has given the brilliant results that have followed the operation of "laryngo-fissure." Successes ranging from 80 to 90 per cent are reported by various operators, while others have discarded all form of treatment in favor of total laryngectomy.

In performing the operation of "laryngo-fissure" or thyrotomy, surgeons differ somewhat in their technique. Some prefer tracheotomy and packing of the larynx after excision of the growth, while others expose the trachea but omit the packing and tracheotomy unless complications arise. I have used diathermia for the destruction of the growth after thyrotomy with most excellent results in 3 cases. I have performed "laryngo-fissure" in 10 cases: the first case, who died of recurrence, should have had a total extirpation of the larynx. The other 9 are living, the oldest 11 years, one 6 years and the remaining 8 less than $3\frac{1}{2}$ years without recurrence.

If the disease has extended beyond the limits of a safe "laryngo-fissure," then a total extirpation of the larynx should be advised, provided the general condition of the patient justifies the operation. If the growth is untreated by radical surgery, the mortality is almost 100 per cent, while the operative mortality is becoming notably less by improved technique and improved methods of post-operative treatment.

DIAGNOSIS OF EXTRINSIC CANCER

The symptoms of this type of cancer are variable and uncertain. They proceed rapidly and silently, and their presence may not be suspected until extensive metastasis has taken place in the cervical lymphatics. Growths in the laryngo-pharyngeal region are usually malignant and are seldom seen in an early stage. Perhaps more would be discovered early if globus hystericus could be entirely forgotten. At times, the diagnosis is best and most easily made by removing a metastatic gland for study. The same routine studies should be made as mentioned under intrinsic cancer.

TREATMENT OF EXTRINSIC CANCER

Extrinsic cancer of the larynx is a very grave disease, and its treatment, therefore, when possible requires prompt, bold and often extensive surgical procedure. Regardless of location, there are two types of extrinsic cancer, the hopeful and the hopeless. The hopeful cases are those without palpable evidence of glandular metastasis or those with definite glandular metastasis limited to the neck, in fairly good general health and in which the glands are movable and susceptible of being completely excised; the hopeless are those in which the metastatic glands in the neck are massive and fixed, those in which there is X-ray evidence of mediastinal involvement, and those in which the general condition of the patient would preclude an extensive operation.

William Trotter, of London, has suggested an anatomical division of extrinsic cancer into two groups, "epilaryngeal and hypopharyngeal. The epilaryngeal type originates in two principal sites: first, the epiglottis; second, the aryepiglottic folds. The hypopharyngeal type, known also as post-cricoid cancer, originates in the narrow part where the pharynx is attached to the posterior surface of the cricoid ring. It embraces two well recognized forms as it originates; first, in the narrow part of the lower pharynx where it is attached to the posterior surface of the cricoid ring, or second, in the sinus pyriformis."

In the treatment of extrinsic cancer of the larynx, one should have the cooperation of an experienced radiologist and must have at his command a suitable diathermy apparatus and the use of an ample supply of gold emanation tubes or platinum needles. The use of these adjuncts is of invaluable assistance in attempting to eradicate the disease in those patients in whom the extension is so great that its removal *en masse* is impossible.

TREATMENT BY X-RAY AND RADIUM

The application of these agents for the cure of laryngeal cancer has been most disappointing when they are used alone. In my experience there have been no lasting results. Formerly we advocated their use as a preoperative measure, but when extensive dissections are required the marked fibrosis which follows their use interferes very materially with plastic closure, and we are now limiting their usage to post-operative treatments, which we find most advantageous. In the treatment of recurrences, which have followed laryngectomies, we have had some very remarkable results following their application.

SURGICAL TREATMENT

The epilaryngeal type in patients who have no apparent cervical glandular involvement and in whom the cancer is limited to the epiglottis, I prefer approaching the disease by the subhyoid route. The patient is administered a rectal anesthetic, either in the form of advertin or ether in oil, a tracheotomy is performed and a dissection is carefully done so as not to injure the superior laryngeal nerves. If the growth has extended to the base of the tongue to such an extent as to preclude its removal by dissection, the area is diathermized and gold emanation tubes are inserted into the diseased portion. The larynx is packed above the tracheotomy tube with iodoform gauze, a nasal feeding tube is inserted, and the wound is securely closed.

Healing takes place usually in from 1 to 3 weeks.

I have performed this operation on 4 patients: 1 is living and well after 5½ years, 1 patient died 3 years after operation from cardiac disease, 1 patient died 10 days following the operation from bronchial pneumonia, and the fourth patient died about 2 years after operation from a recurrence.

In the epilaryngeal type with glandular metastasis, the Trotter modification of the Langenbeck's operation is the operation of choice; the technique has been quite recently well and fully described by Dr. Orton and Mr. Colledge. It opens a much wider approach to these structures and besides makes it possible to cover the pharyngeal defect by implanting a skin flap.

In the hypopharyngeal type, or the postcricoid involvement, the trans-thyroid pharyngotomy or the Trotter operation has given splendid results in the hands of Trotter and Colledge. Those cases in which the primary lesion has been intrinsic with extension beyond the larynx, or in which there is a primary extrinsic lesion with extension into the larynx, require a total laryngectomy by the one-stage operation with the removal of other structures which may be involved, including usually the upper part of the esophagus. As this type of case requires extensive removal of the structures in front of the neck, we have found that a preliminary gastrostomy is to be preferred to feeding by the nasal tube. When possible, the skin is preserved in order to facilitate the reconstruction of the pharyngo-esophagus.

Patients of this type require very careful and diligent nursing. A reconstruction of the pharyngo-esophagus is not attempted until complete healing of the wound has taken place. In all types of operations the patient is treated by X-ray or radium or both, when he has sufficiently recovered as to warrant its administration.

In patients having this type of involvement in varying degrees, 60 have been operated upon by this method, and of this number 29, or a little over 48 per cent, are still living.

RECENT ADVANCES IN SURGERY*

Edmund Horgan, M.D., Fred C. Fishback, M.D., and Guy W. Leadbetter, M.D.
Washington, D. C.

General Surgery

Lilienthal has contributed a resumé of his experiences with the operative treatment of abscess of the lung. He insists that the rapidity of progress and the virulence of accompanying sepsis should be the determining factors in the decision to operate, rather than reserving surgery only for abscesses of long standing. Local anesthesia is to be preferred to general, which, if used, should be so light as to preserve the cough reflex. The head of the patient should be lower than his hips. Always avoiding pleural involvement, evacuation should be by the most direct route. To prevent hemorrhage, only gentle manipulation of the cavity should be used. One should refrain from the natural tendency to convert multiple cavities into one, at the time of operation.

Babcock and **Jackson** report their method of one-stage operation for pulsion diverticulum of the esophagus. Exposure is obtained through a short transverse incision at the level of the cricoid cartilage. The esophagoscope is introduced rapidly, a previously swallowed thread being used as a guide. The esophagoscope facilitates the identification of the diverticulum. The diverticulum is excised and the defect closed with 2 layers of fine silk suture material. Feeding is done through a duodenal tube for 7 to 9 days. The return to a diet of solid foods is not allowed until at least 6 weeks have elapsed.

Garlock has reported 4 cases of gangrene of the distal part of the finger following minor surgery under novocaine anesthesia. In each case, diffusion of the anesthetic beyond the operative site had been prevented by a narrow rubber tourniquet applied at the base of the finger before infiltration of the digital nerves. The author recommends an Esmarch bandage as being safer, and in any case warns against the use of a narrow tourniquet when one has to be applied to the base of the finger.

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* This is the first of a series of articles to be published from time to time in the Medical Annals under the designation "Recent Advances."

Every investigator who has had occasion to inject adrenalin subcutaneously into dogs has noted the occasional development of gross sloughing, at the site of injection, the result of the intense ischemia produced by the adrenalin, which, as Koppanyi has shown, remains in the tissues for days. Such sloughing occasionally results from the too generous employment of adrenalin in novocaine solutions used for infiltration anesthesia.

Bland, Wenrich and **Goldstein** have found Trichmonas vaginalis infection in 22.7 per cent of 600 gravid women. The organism was never present in the cervical canal. All of their patients had abnormal vaginal secretions, but only 13.2 per cent complained of irritating symptoms. The puerperal morbidity rate for such patients was considerably higher than those parasite-free. They advocate that gravid women with frank trichimonad infection should be treated and relieved of their infestation, if possible, during the antenatal period. The treatment which they found most satisfactory consisted in first thoroughly cleansing the vulva and vagina with green soap and warm water. Second, the vagina is dried with cotton pledgets and completely swabbed with saturated aqueous solution of picric acid (1 per cent). Finally, a one-half of 1 per cent lactic acid douche is used twice daily for several weeks to encourage the resumption of growth of the normal bacterial flora.

Harvey Stone reports 5 more cases of anal incontinence which were successfully treated by anchoring 2 strips of fascia lata, each of which begins at the margin of the gluteus maximus muscle, encircles the anal canal and is fixed to the gluteus maximus muscle once more. This operation gives 2 slings which interlock on partial contraction of the glutei, thus closing the anal canal, and giving the patient voluntary control of the lower end of the bowel. This operation has proven a successful procedure in certain well selected cases.

Lund reports that the percentage of cures in patients with epidermoid carcinoma of the cervix is twice as great when the patients are of normal weight, as compared with similarly afflicted patients who are much over, or much under normal weight. A definite but less marked relationship of weight to prognosis was found in the case of patients with adenomocarcinoma of the cervix and fundus.

Steinberg describes a rapid method of immunizing dogs against colon bacillus peritonitis. All the controls died of peritonitis. Some of the immunized animals recovered. The procedure consists of the injection of a killed culture of colon bacillus into the peritoneal cavity 4 or 5 days before operation. This evokes considerable local phagocytic reaction, so that subsequent contamination is more readily combated. This work is a continuation of work reported previously by **Steinberg** and **Goldblatt** in 1927. It was later independently verified by **Herrman, Rankin** and **Bargen.**

Deaver and **Burden** have summarized our present knowledge of the common bile duct. They urge the more frequent use of the T-tube in cases of stricture, infection, and stones impacted in the pancreatic portion of the duct. The maxim for all surgery on the biliary tract should be "see well what you do."

Puestow has devised an ingenious method of exteriorizing a small segment of duodenum containing the ampulla of Vater, that he might study the flow of bile into the duodenum. Complicating factors were avoided by the evulsion of the minor pancreatic duct. In the fasting dog, the orifice of the choledochus was usually closed and there was no flow of bile. The pressure within the common duct was from 140 to 170 mm. of bile. The absence of bile flow was obviously due to a sphincter mechanism at the duodenal end of the choledochus, probably due chiefly to a special sphincter mechanism, as well as to the tonus of duodenal musculature. Food stimulated the flow of a brown, viscid bile. The first ooze began with the ingestion of food and lasted up to 3 minutes, due probably to psychic or reflex stimulation. A secondary flow started

10 to 30 minutes later and lasted several hours, coming in brief spurts which were sometimes related to duodenal activity but often occurred independently. Respiration was not a significant factor in the discharge of bile. After cholecystectomy, bile continued to flow in the fasting as well as the non-fasting state. Such bile, however, was lighter and less viscid than the bile which flowed after an animal with an intact gall bladder had been fed. Feeding had but little effect on the discharge of bile, except to increase the quantity slightly. The orifice of the choledochus remained patent. The intraductal pressure in the choledochus was reduced to 10 to 20 mm. of bile. The intravenous administration of bile salts produced a profuse flow of thin yellow bile. Various solutions applied locally to the exposed segment of the duodenum occasionally stimulated very slight duodenal activity and rarely were followed by the expulsion of a drop of bile, although generally they did not produce a definite response.

Elman and **Graham** show that the gall bladder excretes cholesterol, rather than absorbs it, especially in the presence of inflammation. They explain the origin of the "strawberry" gall bladder on the basis of increased excretion of cholesterol, with deposition of cholesterol under the mucosa when bile for one reason or another is unable to take up any more.

Bollman and **Mann** report that following ligation of the common bile duct in dogs, about 70 per cent develop typical chronic duodenal or gastric ulcers within 5 to 295 days postoperatively. These experiments give further support to the contention first advocated by Mann that the essential cause of chronic duodenal ulcer is injury to the duodenal mucosa by a highly acid gastric juice which for some reason is not promptly neutralized by the alkaline duodenal secretions. Undoubtedly, bile contributes largely to the neutralization of ejected juice, partly on account of its alkali content and partly on account of the buffering action of bile salts. This is another link in the chain of evidence which is daily becoming stronger that peptic ulcer is the result of an acid-base imbalance at some part of the upper digestive tract.

Elman and **Hartman** have been able to produce peptic ulcers of the duodenum in dogs, after the total exclusion of pancreatic juice through a collecting system to the outside. Their dogs developed ulcers within 13 to 18 days. In their opinion the pancreatic juice plays a major rôle in the neutralization of the gastric acidity by reflux into the stomach.

Pearse calls attention to the reduction of strangulated hernia en masse. The strangulated mass is forced into a properitoneal position, by taxis, often by the medical attendant. The presence of such a preformed properitoneal sac is usually the result of the use of a poorly fitting truss. The diagnosis is made by the persistence of symptoms of intestinal obstruction after the apparent reduction of a strangulated hernia.

Weeks and **Mueller** report the result of the injection treatment of varicose veins in 325 cases. They feel that this method is the safest and surest for ridding a patient of varicose veins. If cases suffering from recent superficial phlebitis are excluded there should be no mortality. They advocate a simple method with single injections at each treatment. Their best results were achieved with quinine and urethane solution. Salicylate solutions and solutions of saline and glucose were followed occasionally by severe cramps or sloughs.

A better understanding of the problem of treatment presented by cancer of the rectum has been established since **Miles** (1908) reviewed the subject and devised the abdominoperineal operation, a procedure the merit of which is based upon the better access it affords to the fields of metastasis. As a one-stage operative procedure the mortality, which was high, was reduced by the two-stage procedure of **W. J. Mayo** (1912), who did the abdominal part of the operation 10 to 14 days before excising the lesion by the Kraske method, etc., through the perineum. This had its disadvantages in that perforation of the distal portion of the gut, which had been excluded from the peritoneal cavity at the first stage, gave a new mortality factor. In order to prevent the dangers of perforation **Coffey** (1914) inverted the distal segment by means of a traction tube inserted by way of the anus and to which the distal gut was sutured, and he, like Miles, established extraperitoneal drainage of the pelvis, per vaginum in the female and through the anterior abdominal wall in the male.

Conservative surgical approach to lesions of the rectum and recto-sigmoid, by secondary or additional intermediate stages, where indicated, decreases the surgical risk and likewise the mortality, and increases the percentage of cure because more complete removal of the metastatic radicals can be accomplished.

ORTHOPEDIC SURGERY

Progress in orthopedic surgery continually presents a wealth of new procedures, many of which have not as yet been thoroughly evaluated. The **Nicola** operation for recurrent dislocation of the shoulder is well proven and gives the most satisfactory results of any procedure thus far brought out. Approximately 130 cases have been operated on and there have been no recurrences. Briefly, the operation consists of opening the shoulder joint, dividing the tendon of the long head of the biceps and passing it through a hole drilled from the bicipital groove through the head of the humerus and resuturing it at its point of emergence. No extensive capsulorraphy is necessary and the transplanted tendon serves as a strong ligamentum teres which suspends the head of the humerus in the glenoid fossa. There is no interference of the normal action of the biceps following such operation. The limitation of abduction is controlled by the point at which the tendon enters the head of the humerus with relation to its origin. Most cases have no restriction of motion and, therefore, one may expect an unusually good function after healing is complete. It is undoubtedly the safest, simplest and soundest of all operations for recurrent dislocation, both anterior and posterior, of the shoulder.

The treatment of osteomyelitis is rather definitely standardized. The maggot treatment proposed by **Dr. Baer** is spectacular and good. However, it demands considerable equipment and diligent technical care for its proper use and is not particularly applicable for use in general hospitals by the average general surgeon or general practitioner. The **Orr** method has been thoroughly proved and consists of a careful debridement of the infected bone area, the proper preparation of the cavity, thorough cleansing, packing the wound with sterile vaseline gauze, and applying absolute fixation to the part. The pack is not disturbed for several weeks, although the top dressings may be changed as the discharge becomes offensive. On removing the pack one may expect to find a freshly granulating surface covering the cavity. This treatment is suited to the rank and file of the profession, shortens the postoperative course, minimizes the loss of limb, and brings about a rapid improvement in the general condition of the patient. The mortality rate is insignificant.

The problem of back injuries is still presenting difficulty from the industrial standpoint. In general the treatment has been crystallized into 2 forms: (1) the conservative, which consists of immobilization, manipulation and immobilization, and support, and (2) the radical, which consists of internal fixation by means of the **Hibbs'** fusion and modifications thereof and sacro-iliac fusions either by the method of **Smith-Peterson** or **Campbell.** The radical procedures are of doubtful value in the industrial type because of the psycho-neurotic element usually present. Such treatment, however, is definitely indicated in the long-standing or recurring case in private practice.

Treatment of fractures in general is rather kaleidoscopic, but suspension traction method applied to bones of the lower extremity has undoubtedly come to stay. The results obtained are not only better than those by manipulation or operation, but are obtained with much less work. Traction in fractures of the humerus is being rapidly improved. Much emphasis is being laid upon the proper fixation of fractured bones with splinting of the injured extremity in the position of greatest utility and relaxation. Early and carful mobilization of joints in juxtaposition to the fracture prevents a long period of disability. Skilled after-care of fractures cannot be too strongly stressed. In a recent publication **Sir Robert Jones** has clearly brought to our minds the fundamental principles to be applied in treating stiffened joints.

Science Series. No. 4

THE RÔLE OF CALCIUM IN THE BODY

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In the human body the compounds of calcium and the calcium ion are associated with the following important functions: (1) the formation of bones and teeth; (2) the coagulation of the blood; (3) the coagulation of casein following the digestion action of rennin; (4) the maintenance of optimum physiological conditions for the functioning of nerve and muscle.

As a structural and supporting substance calcium plays a unique rôle in both the inorganic and organic world. This is because certain salts of calcium, namely, the phosphate, the carbonate and the fluoride, are highly insoluble in a neutral or alkaline medium. It is, therefore, not surprising to find calcium compounds entering into the formation of bone. Of the 50 to 60 per cent of mineral matter in bone, calcium phosphate makes up about 85 per cent, calcium carbonate about 10 per cent, and calcium fluoride around 1 per cent. The cement and dentine of the teeth have about the same calcium composition as bone, but about 90 per cent of the total substance of the enamel consists of calcium compounds, a composition which accounts for the greater hardness of this substance. Calcium thus has an important rôle in supplying material for the skeletal growth of the young and for the maintenance of the composition of the hard tissues of the adult.

It is very well known that calcium ions are necessary for the coagulation of the blood. Blood will not clot when mixed with decalcifying agents such as the soluble salts of oxalic, hydrofluoric or citric acids. The effect of oxalates and fluorides is to precipitate the calcium ions from solution, and the influence of citrates is to depress the ionization of calcium to a level below which the calcium ions are ineffective.

In the presence of calcium ions the digestive enzyme, rennin, converts the soluble casein of milk into insoluble calcium paracaseinate. If milk is decalcified and then treated with rennin, the casein will be converted into paracasein, but coagulation will not occur unless calcium ions are reintroduced into the milk.

Calcium ions have a sedative influence upon the motor nervous system. If the ionic calcium concentration of the blood of an individual is lowered, there will ensue varying degrees of hyperexcitability, ranging from mildly exaggerated reflexes to active tetanic spasms. Calcium ions are also concerned in the regulation of heart action. The effect of calcium upon the heart is to promote contraction of the heart muscle; its action is balanced by the antagonistic effect of sodium and potassium, which promote relaxation.

Calcium is absorbed from the intestinal tract in the form of the calcium ion. Not all of the calcium ingested by mouth is absorbed. A portion of the calcium taken into the alimentary tract is absorbed from the gut, and after undergoing a metabolic course is excreted either in the urine or the feces; and a part of ingested calcium is never absorbed, but passes through the intestinal tract in the form of an insoluble calcium salt. It has been found that under the usual dietary conditions the normal adult excretes about 65 to 75 per cent of ingested calcium in the feces and 25 to 35 per cent in the urine. That calcium is excreted in the feces has been shown by injecting calcium chloride intravenously into rabbits. By such experiments it has been demonstrated that two-thirds of intravenously injected calcium chloride may be recovered in the feces and one-third in the urine.

The absorbability of calcium is dependent upon the solubility of the compounds in which it exists in the intestinal tract, and this is greatly influenced by the reaction of the intestinal contents. Acidity-producing factors, such as acids, acid salts, and buffers against alkali, tend to force more calcium salt into solution and thus promote the absorption of calcium from the alimentary tract, while alkalinity depresses this process. The ingestion of acids, or acid-producing substances, along with calcium salts greatly increases the absorption of calcium from the intestinal tract, while the ingestion of alkalies, or the introduction of foods, which provoke the flow of alkaline digestive juices, will result in a decreased absorption of calcium. The mechanism is now clearly understood. In the intestinal tract there are always calcium precipitants, such as phosphate, carbonate, and fatty acid ions; if the reaction of the intestinal contents becomes sufficiently alkaline, these ions will precipitate the calcium from solution and thus prevent its absorption. Factors that produce diarrhea will also depress the absorption of calcium.

The conditions which favor absorption of calcium from the alimentary tract tend to increase the excretion of calcium through the urine. In general, acidity of the intestinal contents increases the excretion of urinary calcium, and alkalinity favors the excretion of calcium through the feces. These facts indicate the futility of attempting to show whether adequate absorption of calcium has occurred in an individual by the determination of the calcium content of his urine. It is, in fact, not possible to show the amount of absorption by determining both the urinary and fecal calcium, because there is no way of finding out how much of the fecal calcium has passed through the alimentary tract unabsorbed and how much was absorbed from the intestine and excreted back into the bowel. It was because of this mechanism that investigators have had to resort to the determination of the blood calcium concentration in absorption studies to get information upon this phase of the subject.

Calcium exists in the blood in a supersaturated solution; that is, there is much more calcium salt dissolved in blood serum than could be dissolved in water at the same pH as that of blood. A small part of this calcium may be considered as held in solution by the forces that ordinarily govern solubility; a small part is held in solution in combination with proteins; and a considerable part must be considered as existing in a supersaturated solution. The factors which maintain the supersaturated state of calcium in the blood are unknown, but it is believed the parathyroid hormone has some influence in this respect. It has been calculated that about 2 mg. of calcium per 100 cc. of serum exists as ionized calcium. The amount of combined calcium in blood serum roughly parallels the protein content of the latter; it is approximately 0.5 mg. for each gram of protein. A normal protein content is, therefore, necessary to maintain a normal blood calcium concentration. When the serum proteins are lowered, as in a nephrosis, or in the acute stages of a glomerulonephritis, the total calcium content of the serum is reduced correspondingly. There are no tetanic or rachitic symptoms, however, in hypocalcemia due to nephritis or nephrosis, because the decrease in blood calcium is at the expense of the calcium combined with proteins and not of the ionic calcium. Tetany and rickets are characterized by decreases in the concentration of the ionic calcium, and are not related to changes in the calcium combined with proteins.

Spinal fluid contains about 5 mg. of calcium per 100 cc., and edema fluids and serous exudates contain about 5 to 7 mg. of calcium per 100 cc. The calcium content of these fluids is about equal to the amount of calcium in the blood if we deduct the fraction of blood calcium that is in combination with proteins. The diminished protein content of these biological fluids thus seems to be the reason for the lower calcium content of the latter, since proteins have the capacity to combine with calcium and hold it in solution.

The calcium concentration of the blood of normal fasting subjects is 9 to 11.5 mgm. per 100 cc. of serum. The circulating level of blood calcium is influenced by the secretion of the parathyroid glands, the adequacy of the calcium and vitamin D contents of the diet, and the amount of exposure to ultra-violet light. The influence of the parathyroid secretion is to mobilize calcium in the blood and circulating fluids of the body by withdrawal of calcium from the bones. If the parathyroid glands of a dog are removed, the serum calcium of this animal will be lowered, and when the concentration becomes less than 7 mgs. per 100 cc. of serum, tetany develops. Injection of parathyroid extract will bring the level of blood calcium back to normal and relieve the tetany. If parathyroid extract is injected into a normal dog, hypercalcemia is produced. Such experiments show clearly that the effect of the parathyroid hormone is to mobilize calcium in the blood, and since this occurs in a fasting animal, it follows that the elevation of blood calcium by injection of this principle is brought about by withdrawal of calcium from the calcium reservoirs of the body. It is believed that the parathyroid hormone accomplishes its effect by increasing the solubility of calcium phosphate in serum, because there is a coincident rise of calcium and inorganic phosphate in the serum following injection of parathormone.

The amount of calcium in the diet has an important influence upon growth and upon the formation of bones and teeth. It has been shown by Sherman that the diet of a normal adult should contain about 0.68 grams of calcium per day; and that children require in their food about 1 gram of calcium per day in order to maintain optimum growth and insure proper development of bones and teeth. The body does not conserve its calcium in periods of calcium deprivation or calcium starvation, but apparently continues to excrete this substance at the usual rate. If the calcium of the diet is reduced below minimum requirements, the blood calcium will be maintained at a normal level for a considerable time, due to the withdrawal of calcium from the bones by parathyroid action. Continued deprivation of calcium, however, will bring about a decalcification of the bones and hypocalcemia, and the outcome of such a dietary deficiency is rickets in children and osteomalacia in adults. The result of a lowered calcium content of the diet in adults is most conspicuously demonstrated by the osteomalacia that sometimes develops in pregnancy. In this condition there is demineralization of the bones of the mother because of the unusual demands of the fetus for calcium, the mother being upon a diet inadequate in calcium content. The osteomalacia of pregnancy is especially prevalent in China and India, where a diet considerably deficient in calcium is used. Lack of sunlight and of vitamin D also enter into the production of this condition.

Not only is there a necessity for adequate calcium in the diet but there must also be a proper ratio of calcium to phosphorus in the food to prevent calcium deficiency diseases. This ratio is approximately 2 parts of calcium to 1 part of phosphorus. Dietary ratios showing marked variations from the optimum for calcium and phosphorus have been shown to produce rickets in animals. Presumably the calcium-phosphorus ratio of the diet has never required attention, since the usual diet contains a satisfactory ratio. Milk is an example of a food in which the calcium-phosphorus ratio is about ideal.

The diet may contain adequate and properly balanced amounts of calcium and phosphorus, but, if deficient in vitamin D, rickets will ensue. Rickets also results from inadequate exposure to sunlight, and this disease may be prevented, or cured, by exposure to ultra-violet light of 2000 to 3400 Ångstrom units wave length. The antirachitic effects of vitamin D and radiant energy of the proper wave length are the same. The explanation of this influence of ultra-violet light seems to be that it generates vitamin D, or an organic substance very similar to vitamin D, in the body by direct action upon the skin. The exact mechanism of vitamin D action in promoting proper calcium phosphate metabolism is unknown. Some workers have produced evidence that vitamin D promotes absorption of calcium from the intestinal tract; others have done work which seems to indicate that vitamin D promotes the deposition of calcium phosphate in the bones. It is not important to go into either of these points of view. Suffice it to say that rickets is a disease in which there is a demineralizzation of the bones due to a failure to obtain proper deposition of calcium phosphate in bone tissue. This may be brought about by (1) a low calcium diet, (2) low phosphorus diet, (3) a diet low in both calcium and phosphorus, (4) inadequate amounts of vitamin D in the diet, and (5) insufficient exposure to ultra-violet light.

ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Prognosis in Malignant Melanotic Tumors of the Eye,* by **George R. Callender,** M.D., Major, Medical Corps, U. S. A.

In the study of malignant neoplasms no method of research promises more than the accumulation of tissues and accurate records of patients afflicted by such tumors together with the careful observation of these cases for sufficient periods of time to determine the outcome. In the past, and to a considerable extent in the present, dependence has been placed on the results of individual experience, which, when analyzed, is found to be based on rather inadequate data. The establishment of registries to which large numbers of persons contribute the records and tissues of their cases results in the accumulation of a larger number than would ever be seen by any one individual. The following up of these cases by the contributors, stimulated by requests for reports from time to time, soon builds up data based on fact rather than opinion, and results in an increased knowledge of the conditions studied.

As an example of the operation of a tumor registry, this report is made of a series of 111 malignant melanotic tumors of the eye, their classification and prognosis. The usual method of classification of malignant melanomas of the eye is based largely on clinical grounds, and consists of three stages: (1) in the first stage tumors of the choroid produce visual symptoms of varying character depending upon their location; those in the posterior portion of the eye in the vicinity of the nerve and macula cause disturbances of vision early, while those of the ciliary region and iris become visible by examination; (2) in the second stage, most noticeable in tumors of the choroid, there is a secretion or transudation from the tumor which causes a separation of the retina and an increase in intra-ocular tension, i.e., glaucoma; (3) in the third stage, there is an escape of the tumor to the outside of the globe. If this escape is in the anterior part, it is discovered on examination. If in the posterior part of the orbit, it may cause a protrusion of the eye but often is discovered only after the eye has been enucleated.

Melanotic tumors arising within the globe usually escape to the orbital tissues along the ciliary vessels or vortex veins. Rarely, the escape is alongside the nerve and then usually in the vicinity of the anastomosis of the posterior ciliary vessels with the central vessels of the nerve. In cases where there are no obvious external nodules, one is still never sure that the tumor has not extended through the sclera, for there are many vessels, and it would be practically impossible to section all of those passing through the sclera over the area affected by the tumor.

The microscopic study of the 111 malignant melanotic tumors of the eye which have been accumulated over the past ten years in the Division of Ophthalmic Pathology of the American Registry of Pathology at the Army Medical Museum revealed the following, easily distinguished, histologic types:

(1) Spindle cell type, consisting of two subtypes:
  Spindle cell subtype A consists of sheets and whorls and other irregular arrangements of spindle cells having oval, delicately stained nuclei, no distinct nucleolus, and fiber-like cytoplasm extending from both ends of the nucleus.
  Spindle cell subtype B shows the same arrangement of cells with less intercellular substance than in subtype A, while the nucleus is more heavily stained and has a clearly defined, deeply stained nucleolus.

(2) Fascicular type consists of cells arranged in columns or fasciculi, the long axis of the cells being arranged at right angles to a central capillary blood vessel or lymphatic. The nucleus is like that of the spindle cell subtype B. Fiber-like cytoplasm extends from one end of the nucleus toward the central capillary, the other end being blunted or oval. There are usually many polygonal cells in this type.

(3) Epithelial cell type consists of irregular arrangements of epithelial-like cells, the cell size usually varying markedly in one and the same tumor, although sometimes the size of the cells is remarkedly uniform.

(4) Mixed cell type is composed of any two or more of the types previously described and is the most frequent of the malignant melanotic growths.

Pigmentation is greatest in the mixed cell type, somewhat less in the epithelioid type, moderate in spindle cell subtype A, scanty in spindle cell subtype B, and very difficult to find in the fascicular type. Spindle cell and fascicular types have been found only in the uvea. Epithelioid and mixed cell types have also been found arising outside the globe in the limbus area.

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* From the Ophthalmic Division of the American Registry of Pathology at the Army Medical Museum; Presented January 27, 1932.

While the duration of observation is insufficient to allow definite conclusions to be drawn, there are no deaths reported from the 35 cases of tumor in the spindle cell types. The case fatality rate of each of the other three types is between 25 and 30 per cent. The larger proportion of the cases have not been followed for five years, but there are 10 cases living more than five years after enucleation.

DISCUSSION

Participated in by Drs. William Thornwall Davis, Oscar Wilkinson, S. B. Muncaster, E. G. Seibert, and A. C. Christie.

Dr. Wm. Thornwall Davis: Major Callender's paper was most instructive. The early recognition and removal of these tumors is essential if life is to be conserved. As an illustration I may mention a woman who came in July 11, 1930, complaining of dim vision in the left eye. There were no other symptoms. In the lower part of the fundus of the left eye a dome-like, inky black mass was seen. There was no light transmitted through this tumor upon transillumination of the globe. The eye was removed and the laboratory diagnosis was melanotic mixed-cell sarcoma of the choroid. There has been no return of the growth nor metastasis.

Major Callender confined his remarks to melanotic tumors involving more particularly the interior of the globe. May I mention another form, melanoma of the conjunctiva. While not rare, it is uncommon. It is sometimes difficult to know just how to handle these cases. If we attempt removal we may light up a quiescent growth or cause rapid metastatis which may be of very serious moment. Three cases might be mentioned briefly in this connection.

Case 1. A lad of 12 years of age seen in 1921. The growth measured 1 by 2 mm. and was seen to be increasing in size upon further observation. It was removed; there has been no recurrence.

Case 2. A young boy of 15 years of age was seen in 1931. He wished removal of the tumor for cosmetic reasons, but since the growth has remained quiescent and has not increased in size its removal has been discouraged.

Case 3. A white married woman, 30 years of age, presents a melanoma in the conjunctiva measuring 4½ by 8½ mm. She is most urgent in desiring the removal of this growth since she is extremely pretty. She has consulted well-known ophthalmologists in half a dozen American cities, all of whom advise against removal. Personally I am disinclined to remove it surgically but have advised treatment with the thermophore. This is efficient, safe and leaves no scarring, a consideration only too often disregarded by the surgeon and the radiologist.

"Report of Two Cases of Mesenteric Cyst,"* by **J. Ogle Warfield, Jr.,** M.D.

Benevienni (1507) observed the first case, and Tillaux (1880) successfully operated on a mesenteric cyst. There are about 500 case reports. Dowd (1900) suggested an embryonic origin. The causes are: (1) Sequestrations from embryonic retroperitoneal organs, (2) sequestrations from intestinal diverticula or the vitalline duct, (3) dermal inclusions, (4) vascular angiomata, (5) parasitic and bacterial infection, (6) necrosis of lymph glands or solid neoplasms, (7) trauma and foreign bodies, (8) lymphatic obstruction.

The symptoms are those of a silent, cystic abdominal tumor, or those of intestinal obstruction. One-half in the small bowel and one-fourth in the ileal mesentery. These neoplasms vary in size, number, and compartments. The structure of the cyst wall often suggests the genesis of the neoplasm. The contents denote accidents to the cyst. Malignant degeneration is rare. The complications include: (1) Intestinal obstruction, which occurs in one-third of the cases with a mortality of 50 per cent, (2) peritonitis, (3) hemorrhage into the cyst, (4) rupture of the cyst into the peritoneum or bowel, (5) torsion of the cyst, (6) impaction of the cyst in the pelvis. The prognosis depends on many factors. The treatment may be: (1) Enucleation with a mortality of 9 per cent, (2) enucleation and intestinal resection with a mortality of 27 per cent, (3) either drainage or marsupialization with a mortality of 16.6 per cent, (4) aspiration. Of 126 operations there were 24 deaths; one-half had intestinal obstruction and one-half were children of 5 years or under.

Case I: A white, anemic boy, 6 years of age, had abdominal swelling for 3 weeks. The abdomen was greatly but symmetrically distended, tense, cystic and flat on percussion. No organs, tenderness, masses or rigidity were noted. Laboratory studies revealed little. Two abdominal tappings showed bloody fluid. The impression was tuberculous peritonitis. Operation disclosed a very large bluish cyst attached along the entire left lateral peritoneal wall across the pelvic brim, bulging into the mesentery of the ascending and transverse colon and extending high up toward the liver and spleen where it was attached to the posterior peritoneum. It was bilocular and contained about 3800 cc. of bloody fluid. The cyst was marsupialized, and a second operation was necessary to re-establish drainage which lasted 2½ months. One year later he was well except for diastasis of the recti muscles.

Case II: A white boy, aged 2½ years, had had an abdominal tumor for some time. Dr. Copeland diagnosed mesenteric cyst, and at operation Dr. White enucleated a serous cyst from the mesentery of the small intestines.

DISCUSSION: Drs. Joseph S. Wall, Charles S. White, James A. Gannon, Harry H. Kerr, F. O. Coe, and Wallace M. Yater.

"The Surgical Release of Pericardial Adhesions,"* by **Hugh H. Trout,** M.D., Roanoke, Va.

The author regrets the arbitrary divisions of types of operations into two classes, for he feels that the condition of adhesions is a progressive one, and the operation should be planned to meet the extent and character of the adhesions. There have been forty-three operations reported in the literature for the removal of the pericardium and release of the heart from its leather-like prison. There have probably been about two hundred more cases in which the chest wall has been removed from in front of adhesions. The condition is far more frequent than is generally considered. This fact is proved by the routine autopsy findings. It is not found more frequently clinically due to the fact that doctors are not "pericardially minded" and that the diagnosis is difficult. The diagnosis can be made by proper interpretation of the symptoms. The condition occasionally follows a pyogenic pericarditis but is more frequently a late result of rheumatic fever in childhood. The signs and symptoms both depend upon the extent and character of the adhesions. Recently the X-ray, the electrocardiogram and estimation of intravenous pressure have been of great additional aid in making the diagnosis. The film shows the two types of operation usually done, namely the Brauer and Delorme. These films were made from autopsy specimens. The film also shows two clinical cases, one with Pick's syndrome and the other with mediastinopericarditis. The author advocated avulsion of the left phrenic nerve as a supplement to the Brauer operation and reports 43 cases of pulmonary tuberculosis with left basal adhesions in which the circulatory symptoms have been greatly improved as a result of the paralysis of the diaphragm.

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* Presented December 16, 1931.

* Presented January 20, 1932.

DISCUSSION

Dr. Harry H. Kerr: It gives me great pleasure to congratulate Doctor Trout for his splendid contribution. We do not appreciate surgery in cardiac lesions in this country. In the literature we find many contributions from foreign countries and few from this country. Doctor Trout is doing pioneer work in demonstrating the importance and the possibilities of surgery in correcting cardiac lesions. We are on safe ground in attacking the type of lesion that he described and here we can speak with definite knowledge. As to surgery in other types of cardiac disease, the future holds great possibilities. I cannot add anything to the subject, except to put on record the one case I have operated upon. My case was a child, 10 years of age, that was brought up from Central America to Dr. Thomas S. Lee. There was present extensive pericarditis with adhesions to the diaphragm and chest wall. I took out four ribs on the left side, the manubrium sterni and half of the cartilages on the right side. It was most dramatic to see the relief the child got from removal of the constricting chest wall. That relief did not last very long, however. The child died two months later. Had conditions been more favorable a better result would have been accomplished. I am sure we all join in thanking Doctor Trout for the excellent presentation of a most interesting subject.

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MEDICAL SOCIAL SERVICE IN THE DISTRICT OF COLUMBIA

When we speak of medical social service we refer to that social agency which is developed within a medical institution, that is, a hospital or a dispensary.

Within fifty years medicine has shifted its emphasis from cure to prevention and in addition the public, unselfishly or for its own protection, demands care for all, whether they can pay or not.

Hospitals have increased in great numbers and within twenty years the number of dispensaries in the United States has grown from 100 to over 1000.

Medical progress is reflected most from day to day in these hospitals and dispensaries. Accurate diagnosis grows in importance and is coming to demand a more varied type of information. Both diagnosis and plan of treatment in public medical institutions have come to depend not only upon physical and laboratory findings, but also upon social factors as presented through medical social service.

Inasmuch as any medical social service program must receive its impetus from the medical staff of the hospital and dispensary, it is fitting that a discussion of this subject should appear in the Medical Annals of the District of Columbia.

In the Health and Hospital Survey of Washington, completed in 1929, under Comments on Social Service, we find this statement, "the primary purpose of a Medical Social Service Department is to further the medical social case study and treatment. The major activity of the department, therefore, should be medical social case work. The method is that of social case work, correlated with medical treatment."

To one unfamiliar with social work terminology, this statement may appear indefinite and confusing. Reduced, however, to simple fact, it means that a social worker in her study of a patient has as her responsibility the investigation of social factors in the life of the patient as they may relate to the medical problem already stated by the physician, and to the carrying out of treatment as recommended by him.

For instance, a physician in a cardiac clinic recommends for his patient limitation of activity, special diet, and the usual expensive medication which goes with the treatment of heart disease. There are many things in the usual clinic set-up which make it difficult for the physician to determine possibilities in home treatment, such as, the pressure of time, the isolation of the patient from his natural environment or the possibility that the patient may either over-emphasize or under-state his difficulties. Would it not be a contribution to the more successful treatment of this patient to have presented through the channels of medical social service accurate information concerning his environment; data on family income; facts regarding patient's responsibility in the home; family attitudes, which are certainly significant in a long time treatment plan, and other conditions which would undoubtedly militate against successful treatment?

Frequently a social worker in an unhurried interview may have the opportunity to observe and, if necessary, correct the patient's attitude toward his illness and, by interpreting to other members of the family the recommendations of the physician, may bring about a better understanding and thereby secure more adequate cooperation in treatment.

In order to do this the social worker must know enough about medical problems to understand the physicians' recommendations; the physician, in turn, must be as interested in treatment as he is in diagnosis, and must have the patience to explain the medical problem to the social worker, carefully mapping out the prescribed treatment.

It has been said, "There is no good medical social service without good medical practice," and, with the growing recognition of the importance of social data as an aid in treatment, the time will undoubtedly come when we may say, "There is no good medical practice without good medical social service."

In the present day, medical treatment is carried on extensively outside the patient's home,—in the doctor's office, in the hospital or in the dispensary. Because of this condition the physician may be frequently handicapped in obtaining full information as to causative factors. It is difficult to foresee what method may be developed to bridge the gap between the patient in the doctor's office and in his home.

The present program of medical social work attempts to fulfill this duty for dispensary and ward patients. The department of psychiatry has already found it helpful to employ psychiatric social workers to assist in the social treatment of private patients.

The following requests made by physicians are indicative of the varied types of service a medical social service department may be called upon to render:

(a) Mary T., white, aged 6 years, recovering from pneumonia, will need period in convalescent home. Can you arrange it?

(b) Margaret, white, aged 26 years, diagnosed advanced tuberculosis, a transient in Washington, residence in West Virginia, patient indigent. Will you arrange for admission to sanitorium in West Virginia?

(c) Evelyn, colored, aged 9 years, diagnosed as pulmonary tuberculosis. History states an older sister died 1 year ago of pulmonary tuberculosis. There are 8 brothers and sisters. See what can be done for the family.

(d) Charles, white, aged 15 years, diagnosed diabetes, will be discharged on weighed diet. Will you determine family's ability to supply scales and diet, also, how much coöperation in treatment may be expected?

We might go on indefinitely, each person referred for help presenting an individual problem, which must be met by a specific solution.

Many unusual developments arise in the course of a social investigation. This may best be illustrated by a brief case summary:

Two boys, aged 8 and 10 years, were sent from the school with a request for throat examination since it was believed by the school physician that their tonsils should be removed. The children stated that their mother was ill and could not accompany them. The dispensary physician asked the social worker to visit the mother as he found the children under weight and ill kept. Home visits revealed the following: A family of 7; mother, father and 5 boys. The children were 10, 8, 4 years, 18 and 8 months. The mother had developed pulmonary tuberculosis soon after the birth of her last child and at the time of the visit was considered by her private physician to be in an advanced stage. She had attempted to look after the children during the period of her illness, and, as a consequence, they had been not only inadequately cared for, but had been subjected to an intimate association with a tuberculous patient. A communication from her physician revealed that he had been endeavoring to hospitalize the patient, but, on account of her concern over the children, she could not be prevailed upon to accept his advice. He asked the worker to do everything possible to bring this about. He stated that he had known the family for some time and had a great deal of respect for the effort the husband had made to support the group. He did not expect any remuneration for his services, but was willing to do anything in his power to assist them. He approved of the plan of complete physical examinations of all the children. When the facilities of transportation to and from the dispensary were made possible by the social worker the mother readily agreed to the examinations. The 8 months old baby was found to have tuberculosis and was immediately hospitalized. He died after two months of tuberculous meningitis. The next older was also admitted to the hospital because of malnutrition and suspected tuberculosis. Fortunately, after 3 months, he was discharged in a very much improved condition and has been found non-tuberculous. In the meantime the other children had been examined and were found, except for underweight and infected tonsils, to be negative. Tonsillectomies were performed on these children. Six weeks after the social worker's first contact with the mother, after she had been reassured of continued interest in her family's welfare, she consented to go to the hospital. She asked the social worker to visit the children regularly and to report to her their condition. The father arranged to place the children under the care of a relative. During the next 18 months the social worker made regular contacts with both the mother and the children. In this interval, the 4 year old boy had pneumonia twice and was under constant medical supervision, and the mother, whose hospitalization had come too late, died. In this case medical social service assisted materially in solving the seemingly unsurmountable difficulty and in placing these children on the road to health. The father at all times coöperated in the plan but would have been wholly unable to carry it through unaided.

Since this type of service is mainly associated with dispensaries, it may be well to consider the local setting in which it might be advantageously developed. Let us review dispensary service in 5 civilian hospitals. It is understood that no patient receives dispensary treatment if he is financially able to afford the services of a private physician. Consequently, this entire dispensary group may be considered to be living on or below the level of health and decency.

We find that, in 1930, there are 13,241 new patients admitted to 5 dispensaries, and, in 1931, this number was increased to 16,653, showing an increase of 3,412. The total revisits in the 5 dispensaries, in 1930, were 139,387, and, in 1931, an increase of 21,718 or 161,105. Indications at present are that this year's attendance will be well above that of previous years.

In one dispensary we find recorded in January 1930, 779 visits; 1931, 1050 visits; 1932, 1329 visits, demonstrating a steady growth in this service.

From 15 clinics we learn, according to data published by the Social Research Department of the United States Children's Bureau, that physicians in Washington gave a total of 4274 hours in 1 month to the treatment of clinic patients, 578 hours of which were in clinics operated by the Health Department of the District of Columbia and the remaining 3696 in free clinics. These data do not represent the entire dispensary situation in the District inasmuch as figures are not available for all. However, it does give some idea of the large number of patients in the city who receive dispensary care and the great amount of time freely given by the physicians.

From a financial standpoint it would be interesting to know the total yearly budget for Washington's dispensaries. Considering the vast expenditure involved, the large number of persons concerned, and the faithful service of the physicians, should not everything be done to make certain that the fullest results in dispensary treatments are being obtained? We feel that it is in this field that medical social service may be employed to advantage.

In Washington care must be exercised to differentiate between the status of medical social service and that of financial investigation. We grant that financial investigation is important, both from the standpoint of justice to the hospital and a fair rate of payment for the patient. It is understood that the person making this investigation should know social conditions, should have a social point of view, and should know the social agencies in the community in order that he may exercise his best judgment for the mutual benefit of the hospital and the patient; but this should not be confused with a program of medical social case study.

In the civilian hospitals in Washington there are but 8 social workers who have qualified for full membership in the American Association of Hospital Social Workers. Active membership in this association requires recognized training and apprenticeship experience under qualified supervision. This should be considered in any extension in medical social work in the District, since it is required as a minimum standard by the American Hospital Association that the director of a medical social service department be an active member of her association.

Medical social service is wholly inadequate in Washington at the present time. No hospital has more than 2 social workers, and with the clinic attendance spread, as it is, over the entire area of the city, it is impossible for so small a staff to cope with the large number of home contacts which are necessary.

Dr. Richard C. Cabot, in addressing the Medical Social Service section at the meeting of the College of Surgeons in New York City in October 1931, emphasized the futility of medical social service without the physician's interest and cooperation. He also pointed out that a medical social service program means more work for the doctor, but it means, too, a greater advantage to the patient. Certainly those of us who have been working with physicians in Washington have had no reason to complain because of lack of cooperation in any given case.

However, when we review the development of medical social service in other cities, it must be admitted that in Washington it has not shown a relative degree of growth. The question naturally arises as to the underlying reason for this fact. When we consider that the trend of modern medicine is definitely toward preventive rather than merely curative measures, does it not seem reasonable that this service as briefly outlined above may offer an assistance of incalculable value to the physicians?

Beatrice Mullin,
Director, Medical Social Service, Georgetown University Hospital; Instructor, Medical Social Service, National Catholic School of Social Service.

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Stated Meeting Held March 2, 1932

The following were duly elected to membership:

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Ernest Lee Yost, 2022 Sixteenth Street, N.W.

Associate Member

James C. Kimbrough, Major Medical Corps, Walter Reed General Hospital.

Applicants for membership to be voted on in May, 1932:

For Active Membership

Edward Joseph Cummings, Harvard Medical School—1915.
Richard Joseph Kemp, University of Maryland—1921.
John P. H. Murphy, Tufts Medical College—1910.
Sanford Morris Rosenthal, Vanderbilt University—1920.

Philip Archibald Eustace Stebbing, Georgetown University—1930.
Frank Hough Towner, Hahnemann Medical College—1906.

For Associate Membership

C. Willard Camalier (D.D.S.), George Washington University—1912.
Addison McGuire Duval, Medical College of Virginia—1929
Frank Herbert Edmonds (Optician), Baltimore Polytechnic. Institute—1890.
Ralph Harvard Goldthwaite, Harvard Medical School—1906.
Joseph Raymond B. Hutchinson, Medical College of Virginia—1930.
Robert Francis Jones, University of Virginia—1909.
William Harrison Norton, George Washington University—1916.
Cleve C. Odom, Vanderbilt University—1916.
Walter Clifton Royals, Tulane University of Louisiana—1917.
Isaac Judah Silvermann (Psych.), University of Melbourne—1911.

A Nominating Committee was elected by the Society to select nominees for each elective office, also members of the Executive Committee and a member of the Program Committee. The personnel of the Committee is as follows:

William J. Mallory, *Chairman*
Thomas A. Groover
E. W. Titus
Joseph S. Wall
William H. Hough

Pursuant to Article VI, Section 1, of the Constitution, the Committee submits to the membership the following nominees:

Term of office, July 1, 1932 to June 30, 1933

For President	Harry Atwood Fowler
For 1st Vice President	Henry R. Schreiber
For 2nd Vice President	Helen Gladys Kain
For Secretary-Treasurer	Coursen B. Conklin

Term of office, July 1, 1932 to June 30, 1935

For members of the Executive Committee	Arthur C. Christie Harry S. Bernton Janvier W. Lindsay
For member of the Program Committee	Daniel LeRay Borden

Election will take place on Wednesday evening, May 4, at 8 P.M.

PROGRAM, SOCIETY ACTIVITIES
APRIL, 1932

April 13: Dr. Burton J. Lee, Memorial Hospital, New York City, "The Diagnosis and Treatment of Cancer of the Breast."

April 20: Program by the Section on Nervous and Mental Diseases.

Major Cleve C. Odom, Walter Reed Hospital, "Encephelographic Studies in Brain Tumor. Report of Cases."

Dr. Walter A. Bloedorn, "Benign Lymphocytic Meningitis. Report of Cases."

Dr. Walter Freeman, "Intracranial Aneurysms."

April 27:

Dr. Samuel Benjamin, "Renal Diabetes."

Dr. Joseph H. Bryan, "The History of Laryngology and Rhinology, and the Influence of America on this Specialty."

THE KOBER MEDAL

The Kober Medal is awarded each year to a member of the Association of American Physicians who has contributed to the progress and achievement of the medical sciences or preventive medicine. This medal is awarded by the Association of American Physicians upon the recommendation of its Council and is provided for by an endowment fund created in 1923 by the late Dr. George Martin Kober, former Dean of Georgetown University School of Medicine. This year the medal will be awarded to Dr. Elliott P. Joslin of Boston who was selected because for many years he has been one of the world's leading authorities on diabetes mellitus. He has carried on important researches in this field. He has simplified and standardized treatment. He has been a great educator in the management of diabetes. He has trained doctor, nurse and patient in the use of his methods both individually and by group instruction. His textbook on diabetes which has gone through four editions is a mainstay of both physician and medical student. His small manual is the bible of the diabetic patient. It was believed that his life work represents a type of sustained and scholarly performance for which Doctor Kober would have been glad to see awarded his prize.

The award will be made at the meeting of the Association of American Physicians in Atlantic City on May 3, but the announcement of the selection of Doctor Joslin will be made on Kober Day, which this year will be held on April 11, at Georgetown University. The medal is a large coined gold one and is struck by the United States Mint at Philadelphia.

A REPLY TO DOCTOR BEVAN

Anent certain statements that have been made in both the medical and lay press, concerning the alleged abuse by a large percentage of the profession in the United States of the privilege for prescribing alcoholic liquors, Dr. John B. Nichols of this Society has compiled the following which speaks largely for itself:

The quantities of various liquors sold on physicians' prescriptions in the United States during the fiscal year ending June 30, 1931, according to the Commissioner of Industrial Alcohol, were as follows:

	gallons
Alcohol	1,094
Whiskey	1,121,115
Brandy	8,238
Gin	2,029
Rum	2,001
Wine	24,141

Counting one gallon of alcohol as equivalent to two gallons of whiskey, and two gallons of wine as equivalent to one gallon of whiskey, the above figures would represent a total sale on physicians' prescriptions during the year of the equivalent of 1,147,642 gallons of whiskey.

At the end of the fiscal year there were 72,160 physicians legally licensed to prescribe liquor. Each being allowed 400 prescriptions per year, representing 400 pints (50 gallons) of whiskey, the total annual quantity legally permissible to be prescribed would amount to 3,608,000 gallons. This leaves out of consideration many thousands of physicians who do not seek licenses at all.

Thus, the total amount that could have been prescribed was 3,608,000 gallons, while the amount that actually was prescribed was only 1,147,642 gallons or 31.8 per cent of that permissible. On the average each physician prescribed less than one-third of the amount to which he was entitled; or each book of one hundred prescriptions lasted on the average for nine months, instead of being used up in the legal limit of three months.

This is not a discreditable showing, and quite relieves the medical profession from the necessity of assuming a defensive or apologetic attitude. There are doubtless some physicians who use their privilege of prescribing liquor to an excessive and improper degree; but in view of the aggregate showing made, the proportion of such must be small. The exact facts should serve as a conclusive refutation of fanatical and impressionistic accusations which unjustly impugn the honor of the American medical profession, and indicate that physicians may be trusted to carry out the law properly and conscientiously.

—J. B. N.

RECENT CONTRIBUTIONS TO THE LIBRARY

"Collected Reprints from the Wilmer Ophthalmological Institute of the Johns Hopkins University and Hospital, Volume II," by Arthur C. Christie, M.D.

"Pharmacology and Therapeutics or The Action of Drugs—Cushny," by George B. Roth, M.D.

"Abstract of Proceedings, United States Pharmacopoeial Convention, 1930," by Dr. Samuel L. Hilton.

REPRINTS RECEIVED

"Superficial Thrombophlebitis: A New Cause of Chest Pain," American Journal of the Medical Sciences, March, 1932, by Worth B. Daniels, M.D.

"The Relation of Infection in Early Life to Subsequent Mental Disorder," Virginia Medical Monthly, February, 1932, by B. M. Randolph, M.D.

"Aneurysm of the Aorta," Virginia Medical Monthly, October, 1931, by Joseph F. Elward, M.D.

"The Diagnosis and Treatment of the More Common Disorders of the Anus, Rectum and Sigmoid," Virginia Medical Monthly, January, 1932, by B. F. Dean, Jr., A.B., M.D., M. S.

"Common Causes of Shoulder Pain," American Journal of Roentgenology and Radium Therapy, June, 1925, by P. F. Butler, M.D., and J. F. Elward, M.D.

"Nontraumatic Diaphragmatic Hernia," American Journal of Roentgenology and Radium Therapy, December, 1929, by Joseph F. Elward, M.D. and Laurence S. Otell, M.D.

"Subastragaloid Dislocation of the Foot. Report of Case." Radiology, January, 1930, by Joseph F. Elward, M.D., and Laurence S. Otell, M.D.

"Subphrenic Abscess: Report of Three Cases Illustrating Diagnostic Problems," Medical Annals of the District of Columbia, January, 1932, by Joseph F. Elward, M.D.

THE WOMAN'S AUXILIARY TO THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

Mrs. Eugene R. Whitmore

Chairman, Publicity Committee

Mrs. Arthur C. Christie invited Mrs. Walter Jackson Freeman, President-Elect of the Woman's Auxiliary to the American Medical Association, to give a talk in her home on February 23 to the chairmen of the different committees of the Woman's Auxiliary to the Medical Society of the District of Columbia. Mrs. Freeman's talk on the different activities of the State auxiliaries was most interesting. Her enthusiasm for the success of the Auxiliary is so great that nothing seems too difficult a task for her to undertake where its welfare is concerned. After Mrs. Freeman's talk a lovely luncheon was served.

On March 9 the Red Cross Unit, of which Mrs. Prentiss Willson is Chairman, held a meeting at the Medical Society Building. After reports were read, Miss Mabel Boardman gave a very interesting talk on the work being done by the Red Cross. Coffee, sandwiches and cake were served.

The Woman's Auxiliary to the Philadelphia County Medical Society has arranged for a Health Institute to be held Tuesday, April 12, at the County Medical Society Building, Southeast Corner of 21st and Spruce Streets. Subjects of diversified interest, pertinent to health, will be discussed by those, who by training and experience, are qualified to speak authoritatively on these subjects. All members are cordially invited. Morning session 10:30 A.M. Luncheon 12:30 P.M. Afternoon session 2 P.M. Luncheon 75 cents. Send reservations (accompanied by check) by April 9 to Mrs. Levi Jay Hammond, The Barclay, Rittenhouse Square, Philadelphia.

The National Chairman of Press and Publicity urges all auxiliary women to read the delightful letters from our National President-Elect, Mrs. Walter Jackson Freeman, appearing every month in the Bulletin of the American Medical Association.

ANNUAL MEETING

May 4 and 5

Wednesday and Thursday

The Medical Society of the District of Columbia expects each member with his invited guests to register and be in attendance at the scientific assemblies on both days. There will be exhibits as follows: Scientific, which will include clinico-pathological material and laboratory demonstration; Technical, the showing of apparatus and products, latest in the development of scientific therapeusis. Twelve exhibitors up to this date have been assigned space in the library.

On Wednesday night is the annual election of officers, and on Thursday night a public meeting to be addressed by Dr. Haven Emerson. Full program of these meetings may be found on page IX in this issue. The get-together luncheon at the Mayflower Hotel on Wednesday, to which all who have registered are invited as guests of the Society, and the Buffet Luncheon on Thursday wlll give opportunity for friendly greetings and demonstration of Washington's well recognized hospitality.

ANNUAL MEETING, MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

May 4th and 5th

TENTATIVE PROGRAM, GENERAL ASSEMBLIES

Wednesday, May 4th–10 A.M. to Noon.

Symposium on Acute Appendicitis

A New Early Diagnostic Sign of Acute Appendicitis. *Dr. James A. Cahill.* (15 minutes)

The Mortality of Acute Appendicitis. *Dr. Joseph P. Shearer.* (15 minutes)

A Review of Eight Hundred Consecutive Appendectomies, With Suggestions for a Newer Method of Treatment. *Dr. Oliver C. Cox.* (15 minutes)

Discussion of all papers to follow reading of the last paper.

A Summary of Recent Developments in Endo-urethral Surgery of the Prostate Gland. *Dr. Joseph F. McCarthy of New York City.* (30 minutes)

12:30 P.M.

Complimentary Luncheon at the Mayflower Hotel

Wednesday, May 4th–2:00 to 4:00 P.M.

Session on Miscellaneous Subjects

Gonorrhea in Female Children, With Special Reference to Newer Methods of Treatment. *Drs. E. W. Titus and Bernard Notes.* (15 minutes)

Basal Anesthesics: A Brief Consideration of Their Effects and Comparative Safety. *Dr. Joseph B. Bogan.* (15 minutes)

Differential Diagnosis by X-ray of Primary Bone Tumors. *Dr. Claude Moore.* (15 minutes)

The Modern Conception and Treatment of Convergent Squint. *Dr. Wm. Thornwall Davis.* (15 minutes)

Perforation of Duodenal Ulcer Following Immoderate Drinking of Alcohol. Report of three cases. *Dr. J. G. Lewis.* (15 minutes).

Discussion to follow each paper.

Wednesday—8:00 P.M.

Stated Meeting, Election of Officers for 1932–1933.

Thursday, May 5th–10:30 A.M. to Noon

Symposium on Vascular Disease

The Clinical Aspects of Aneurism of the Aorta. *Dr. Leslie T. Gager.* (15 minutes)

The Vaccine Therapy of Thrombo-Angiitis Obliterans. *Dr. H. Lynn Colvin.* (15 minutes)

Congenital Arterio-Venous Fistula. *Dr. Charles R. L. Halley.* (15 minutes)

Traumatic Arterio-Venous Fistula Cured by Operation. *Dr. Harry H. Kerr.* (15 minutes)

Discussion of all papers to follow reading of the last paper.

Heart Failure Due to Femoral Arterio-Venous Fistula Cured by Operation. *Dr. Fred R. Sanderson.* (15 minutes)

12:30 P.M.

Buffet Luncheon, Medical Society Building

Thursday, May 5th–2:00 to 4:00 P.M.

Symposium on Cardiac Disease

Congenital Diseases of the Heart in Childhood. *Dr. Margaret M. Nicholson.* (15 minutes)

Cardiac Rupture With Perforation of the Interventricular Septum. Report of Two Cases. *Dr. Edgar D. Griffin.* (15 minutes)

The Goiter Heart. *Dr. Wallace M. Yater.* (15 minutes)

Coronary Thrombosis. *Dr. Emanuel Libman of New York City.* (30 minutes)

Discussion to follow each paper.

Public Meeting

Thursday, May 5th, 8 P.M.

Dr. Haven Emerson of New York City will deliver an address on "The Mutual Responsibility of the Medical Profession and the Laity in the Organization of Preventive Efforts in a Community."

RULES GOVERNING THE GENERAL ASSEMBLIES

1. The time allowed for the reading of papers will be strictly adhered to.
2. Any member or guest of the Society may discuss any paper, but each discussion will be limited to five minutes.
3. Those participating in the discussion are not allowed to discuss any one paper more than once.
4. Each member or guest who desires to participate in the discussion must write his name and the title of the paper he desires to discuss on a slip of paper and hand it to the chairman or presiding secretary before or during the reading of the paper. Names will be called in the order in which they are handed to the desk.
5. If time does not permit, the chairman may at his discretion limit the number of participants in the discussion by eliminating those who last handed in their names.
6. Papers or abstracts of papers together with the discussions or abstracts of discussions will be published during the summer months in the Annals.

GUEST SPEAKERS AT THE ANNUAL MEETING

The Society is fortunate in having three prominent medical men participating in the program. Dr. Joseph F. McCarthy is Professor of Urology of the Post-Graduate Medical School and Hospital of New York City. He is a past President of the American Urological Society. Several popular instruments used by urologists in the posterior urethra have been invented by Doctor McCarthy. Dr. Emanuel Libman is one of the most prominent internists of New York City. His work in connection with the development of the knowledge of subacute bacterial endocarditis is known throughout the world. His freshness of thought is greatly stimulating to all who know him. Dr. Haven Emerson is Professor of Public Health Administration, Columbia University. His work in organizing the medical profession in various fields of public relations is outstanding.

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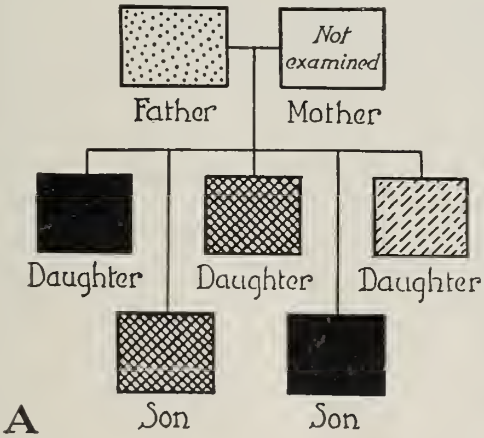
TUBERCULOSIS ABSTRACTS

This Review Issued Monthly by the National Tuberculosis Association is Furnished by the Association for the Prevention of Tuberculosis of the District of Columbia.

TUBERCULOSIS associations are this year emphasizing the importance of following every case of tuberculosis back to its source. "Tuberculosis causes tuberculosis—every case comes from another" is the slogan. Few physicians have been more conscientious and successful in tracing every wisp of smoke back to the embers responsible for it than J. A. Myers of Minneapolis. His special interest is the discovery of early lesions in children, but with the co-operation of a very efficient health department, he has found that tuberculosis is a group disease rather than an individual problem. The "group" is usually, but not always, a family. In a recent article, he cites and illustrates a number of typical case histories, some of which are here reproduced.

TRACING TUBERCULOSIS TO ITS SOURCE

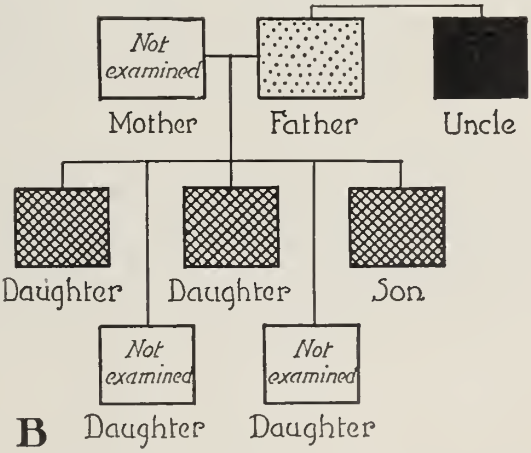
Investigation of family A began when a daughter, who later died of tuberculosis, consulted the doctor. Soon after her death, the son fell ill; his disease is now advanced. About two years later, the second daughter developed tuberculosis. Within another year, another son developed tuberculosis and died. Since both parents refused examination, the exact source is unknown, but the father is suspected of having tuberculosis. It is reasonable to assume that if disease in the father had been discovered years earlier, this disaster might have been averted.



A

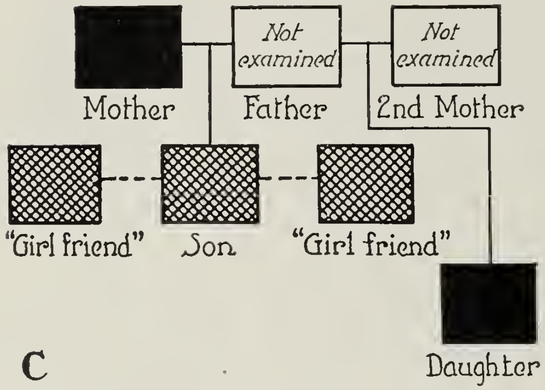
The source of disaster may not always be a resident of the home. In family B, a daughter of 20 years came in for examination. She had frank tuberculosis. An uncle who lived near-by had had the disease for a long time. Contact with him had been intimate and prolonged. Examination of him showed that he had huge cavities in his lung and his sputum teemed with tubercle bacilli. The father is suspected of having tuberculosis but has not submitted to an examination. An interesting fact is that all three children developed clinical disease at the age of 20.

Family C illustrates how infection may be spread in a family and then carried outside the family. The mother died of tuberculosis many years ago, when the son was small. He was not well for a time after, but apparently regained his health. When he reached young adult life his father had remarried and there was a little daughter of two or three years who suddenly developed tuberculous meningitis and died. Not long after the death of the little daughter the son began to show some evidence of failing health. On examination he was found to have an extensive tuberculous process. He was sent to an institution where his symptoms subsided. When he was able to be about he associated with a young lady whose X-ray pictures had previously been entirely clear. He still had tubercle bacilli in abundance in the sputum. After approximately six months of this association the young woman began to cough. Examination showed that she had a very extensive tuberculosis of one lung. She immediately was made a bed patient. A little later this young man became associated with another young woman, and after some time, although her X-ray films had previously been clear, she also fell ill with extensive tuberculous disease.

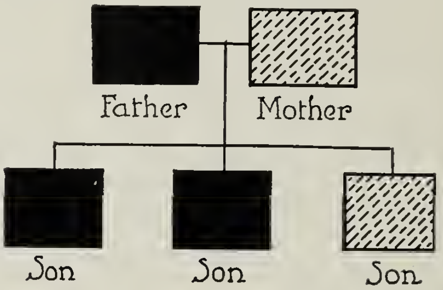


B

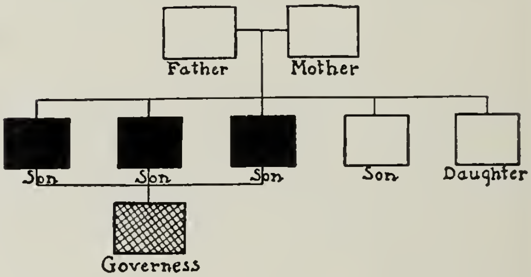
The father of Family D has suffered for sometime from what he believed to be bronchitis. When he reported for examination, he was found to have an extensive tuberculous process and many tubercle bacilli were present in the sputum. The source of his exposure was not known but his family history revealed other cases of tuberculosis. There were two sons in the family when the diagnosis was made. The younger, a small infant soon developed tuberculous meningitis and died. The other son is apparently well, although he has a 3 plus tuberculin reaction. After this man had gone to a sanatorium a third son was born. The father became extremely homesick in the sanatorium and returned to the home. It was not many months later until this third infant son died of tuberculous meningitis. The father then went to a government hospital broken-hearted, for he was firmly convinced by his own observation, that he had infected the two infant sons who had died of tuberculosis. *Tuberculosis—A Family Disease. J. A. Myers—Jour. Outdoor Life, Oct. 1930.*

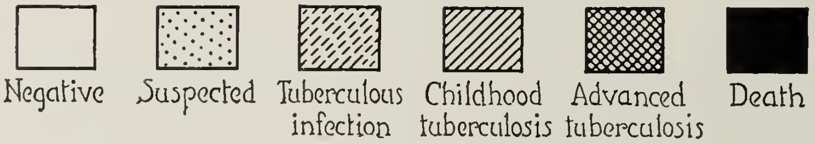

Mother
Not examined
Father
Not examined
2nd Mother
"Girl friend"
Son
"Girl friend"
Daughter

C


Father
Mother
Son
Son
Son

D


Father
Mother
Son
Son
Son
Son
Daughter
Governess


Negative
Suspected
Tuberculous infection
Childhood tuberculosis
Advanced tuberculosis
Death

That the disease may spread in the family through the agency of a servant is illustrated by a case quoted by Myers elsewhere. In a luxurious home in Paris, father and mother in the best of health and with excellent past histories, three boys, one after the other, almost at the same age, died of tuberculous meningitis. Investigation led to the governess, more than 60 years old and a sufferer from chronic bronchitis, emphysema and asthma, which proved to be a case of torpid, senile tuberculosis. She was detached from the family. Nothing else in the home was changed. Subsequently two children were born and nursed exclusively by the mother. "One is now approaching 30 years, the other is a superb girl of 25 years."

MEDICAL ANNALS
of the
DISTRICT OF COLUMBIA

VOLUME I MAY, 1932 NUMBER 5

SURGERY OF THE AUTONOMIC NERVOUS SYSTEM

HARRY H. KERR, M.D., C.M.

HISTORICAL DEVELOPMENT

Surgery of the sympathetic nervous system really began during the World War. Previously Jonnesco and Jaboulay had resected the sympathetic nerves of the neck for various conditions, but they had not established definite indications for such surgery. When Leriche reported the relief of pain and arterial spasm by peri-arterial sympathectomy in wounded soldiers the medical profession immediately became interested in the problems of the sympathetic system. Leriche found that causalgia from wounds of the peripheral nerves was relieved by stripping the adventitia of the main artery of the affected limb. Noting, also, that dilatation of the distal vascular tree resulted, the operation was applied to Raynaud's disease which is characterized by arterial spasm. It was then pointed out by various anatomists that the sympathetic supply to a limb did not all pass by way of the peri-arterial plexus. This plexus is reinforced by sympathetic branches passing to the plexus from the peripheral somatic nerves at various levels. These fibers reach somatic nerves by the rami communicantes or gray rami passing from the sympathetic ganglion to the posterior nerve roots as they leave the vertebral column. To control all of the sympathetic nerves to the affected limb it is necessary to divide the rami communicantes or remove the sympathetic ganglia.

There followed a period when sympathectomy was applied to many different pathologic conditions with varying symptomatology.

In 1923 Royle and Hunter advanced the theory that the sympathetic nerves have something to do with muscle tonus. They applied ramisection to the treatment of spastic paralysis. A great deal of controversy followed this announcement, with many contributions pro and con. It is now generally considered that the sympathetic nerve supply of muscles has very little or nothing to do with tonus of muscle.

ANATOMY

The vegetative nervous system is that division of the nervous system which supplies the efferent and afferent fibers to all smooth muscle and glandular epithelium of the body. It is usually divided into the para-sympathetic and the sympathetic nervous systems. The sympathetic system is made up of a chain of ganglia lying along both sides of the vertebral column. The pre-ganglionic fibers of this system arise from a column of cells in the lateral horn of the central gray matter of the spinal cord. The fibers from these cells pass out to the sympathetic ganglia. These are myelinated fibers, the white rami communicantes. Some of the post-ganglionic fibers from the sympathetic ganglia pass to the spinal nerves for distribution to the central nervous system, and these are the non-myelinated or gray rami communicantes. The vertebral ganglia are connected by a continuous nerve trunk making up the ganglionated cord, which is divided into cervical, lumbar and sacral. The cervical consists of the superior, middle and inferior cervical ganglia. They receive no white rami communicantes, all their pre-ganglionic fibers coming up from the thoracic portion of the cord. The principal branches of the superior ganglia go to the ganglion petrosum of the ninth cranial nerve, to the ganglion jugulare and nodosom of the tenth and twelfth cranial nerves. There are also branches to the first, second, third and fourth cervical nerves. The largest branches of the superior ganglia are the superior cardiac nerves to form the cardiac plexus. Other branches form the carotid plexus both external and internal to the distribution of the arterial branches to the neck and brain. From the middle cervical ganglion branches go to the subclavian artery, to the thyroid and to the heart as the middle cardiac nerve. From the inferior ganglion branches go to the seventh and eighth cervical nerves, to the vertebral artery, to the heart (as the inferior cardiac nerves) and to the lungs. The thoracic division of the sympathetic system consists of the twelve ganglia and the connecting trunk. From it pass the white and gray rami to the somatic nerves, pulmonary branches to the lung, branches to the aortic plexus, and to the three splanchnic nerves. These are distributed to the semilunar ganglion, the aortic renal plexus and the renal plexus. The lumbar sympathetic trunk is composed of four ganglia and their branches to the lumbar nerves, to the aortic plexus and to the hypogastric plexus. The sacral division consists of the four ganglia and its branches to the sacral plexus and to the sacral nerves as gray rami.

The para-sympathetic system is made up of groups of cells in the midbrain, medulla and sacral portions of the spinal cord. Their branches go to the various ganglia in the head, such as the ciliary ganglia, the sphenopalatine ganglia, the submaxillary ganglia and to the cranial branches, as the facial and its ganglia, the glossopharyngeal nerves and the vagus nerve. The sacral outflow is to the descending colon, the organs of the pelvis and the external genitalia. The post-ganglionic fibers from both the sympathetic and para-sympathetic system form the great visceral plexuses to the internal organs: the cardiac plexus to the heart; the pulmonary plexus to the lungs; the esophageal plexus to the esophagus; the solar plexus to the stomach, liver, spleen, diaphragm, suprarenal glands, kidneys, and intestines through the plexus of Auerbach and Meisner; the superior mesenteric plexus to the small and large intestines as far as the splenic flexure; the aortic plexus to the aorta and its branches; the inferior mesenteric plexus to the descending colon, sigmoid and rectum; and the hypogastric plexus and pelvic plexus to the pelvic organs.

Physiology of the Vegetative Nervous System

The physiological action of the autonomic nervous system may be said to control all functions outside the control of the voluntary nervous system. The sympathetic nerves are distributed to the smooth or non-striated musculature of the body, to the blood vessels, to the bowels, to the bladder and uterus, to the piloerector muscles in the skin and to the heart. The glands of the body also get their nerve supply from the sympathetic system. The para-sympathetic division of the vegetative nervous system is distributed to the digestive tract from the oral cavity to the ileocecal junction. It controls the anabolic or building up processes of the body. The sympathetic division, distributed to the muscles, blood vessels, glands, etc., controls the catabolic or breaking down processes of the body.

Diseases of the Vegetative Nervous System

Injuries of the autonomic nervous system are of little importance. Complete loss of the sympathetic system in the experimental animal is not followed by grave disturbances provided the environment is equable. Regeneration after injury of the sympathetic nerves is more rapid apparently than in peripheral nerves.

An interesting group of neoplasms arise from the sympathetic nervous system. Neuroblastoma is a rare malignant growth most likely to arise in the adrenal. It is usually found in childhood and only 1 case of successful removal has been reported. The ganglioneuromata are seen more commonly in the neighborhood of the adrenal or in the retroperitoneal space below the renal fossa. They are usually benign, produce few symptoms and offer a relatively good prognosis after eradication. The carotid tumors arising from the so-called carotid gland are more numerous and far more important surgically. They grow at the division of the common carotid artery, and their symptoms are produced by pressure on neighboring structures. Their surgical attack is a very difficult problem. The mortality in the reported cases is 40 per cent. I am of the opinion that fractional ligation of the common carotid artery before excision will greatly reduce the risk.

There are certain conditions characterized by changes in non-striated muscle either anatomical or physiological that are commonly explained on the basis of autonomic malfunction, probably produced by some obscure change within the ganglion cells or in the hormones acting upon them.

Congenital pyloric stenosis is thought by some authors to be due to incoördination between the pyloric antrum and the pyloric sphincter. Congenital cardiospasm might well be put in the same category. Certainly no other completely satisfactory explanation has been offered. Intussusception may be a disturbance of motor function of the bowel in cases where no other pathology is found.

It is claimed that Hirschsprung's disease is autonomic in origin, that it is an hypertrophy to overcome improper action of the lower rectum and sphincter. I cannot agree with this view since the pathology of the disease is gigantism that may affect isolated portions of the bowel from the duodenum down.

THE EFFECTS OF SURGICAL TREATMENT OF DISEASES OF THE VEGETATIVE NERVOUS SYSTEM

Surgeons have recently attacked the sympathetic nervous system for a varied and heterogeneous group of cases. Many conditions of obscure origin have been operated on in truly an experimental manner. In some, good results have been obtained, but in these it seems to be the alteration of the blood supply that is responsible for the improvement. Division of the sympathetic supply to the vascular tree produces a lasting dilatation of the arteries with resulting increase of blood-flow. In conditions of spasm of the arteries the symptoms are relieved, since contraction can no longer take place in a sympathectomized vessel. Leriche noted an increase in temperature of the affected limb following peri-arterial sympathectomy for causalgia. This observation led him to attack Raynaud's disease in the same way. The results were most satisfactory and it may be now said that ganglionectomy is the accepted treatment in this condition.

Endarteritis obliterans is amenable to sympathectomy. Though the underlying narrowing of the main vascular trunks is not affected, dilatation of the collaterals brings relief of pain and postpones possible amputation. Likewise, erythromelalgia, scleroderma and acrocyanosis are said to be improved. Indeed, one is justified in increasing the circulation by sympathectomy as a palliative procedure when the actual pathology is not affected. In cases of threatened or beginning gangrene from arteriosclerosis, diabetes, or frostbite, a limb may be saved that otherwise would have to be sacrificed.

Sympathectomy by operation or by alcohol injection has been accepted as a rational treatment for angina pectoris. Here the theoretical spasm of the aorta is prevented or decreased. Sufficient time has now elapsed for us to say that in a case of angina pectoris the expectation of life will be definitely extended by cervical sympathectomy.

There are suggestive results reported from sympathectomy in asthma. Perhaps in certain cases where the allergic reaction is not demonstrable, sympathectomy may be justified.

Adson has reported brilliant results following ganglionectomy in certain types of chronic arthritis. In cases of polyarthritis accompanied by cold, clammy extremities, deformity, and limitation of motion, the flushing of the limbs following ganglionectomy has arrested pain, mobilized the joints, and restored the normal color and temperature. I had the pleasure of seeing one of these cases in Rochester that had been operated on on one side only. The contrast between the operated and non-operated limbs was striking. The patient's insistence that the other side be operated on was ample proof of the relief obtained. I have operated on 1 such case with gratifying results.

My experience in surgery of the sympathetic nervous system has been limited to about 50 cases. Shortly before the War I did a number of peri-arterial sympathectomies for causalgia, Raynaud's disease, intermittent claudication, etc. I have found peri-arterial sympathectomy to be useful in vascular lesions of the extremities, but it has little effect on those conditions in which vascular spasm or restriction is not the dominating factor.

For some time now I have given up peri-arterial sympathectomy, since I find ganglionectomy so much more satisfactory. It is obvious that the removal of the adventitia of an artery does not interrupt all the sympathetic supply to that vessel, since it is known that sympathetic fibers pass from the peripheral nerves to the vessels at intervals all along the limb. These fibers reach the peripheral nerves by the gray rami from the sympathetic trunk and ganglia and proceed in the peripheral nerves to their final distribution. Removal of the ganglia interrupts not only the fibers to the peri-arterial plexus but also those to the accompanying somatic nerves.

The most satisfactory results have been obtained in Raynaud's disease. Some surprising improvement has also been noted in cases of Buerger's disease with relief of pain, improvement of color and arrest of threatened gangrene.

I did one case of ramisection for Little's disease in which I thought the spasticity was improved.

When the question of operation in a case of vascular lesion of the extremities is to be decided upon, the flushing of the vascular tree can be produced as a test of relief. The administration of foreign protein intravenously will produce a chill and general vascular dilatation. Measurement of the change in temperature of the limb in question compared with the body temperature gives an indication of the dilatability of the vessels. Clinically the test can be made without taking the surface temperature, since in the cases where a really satisfactory result is obtained by foreign protein, the change in the limb is obvious to the physician as well as to the patient.

My results of sympathectomy in angina pectoris have been reported. Sufficient time has elapsed and a large enough group of cases has been treated to allow me to say that the operation will relieve to a greater or lesser extent. I have had no complete failures and some brilliant results.

A recent case of retinitis pigmentosa to be reported by Dr. L. S. Greene has been treated by superior sympathetic ganglionectomy. Since operation the visual fields have increased markedly and the visual acuity has improved.

I think we may at this time safely say that surgical attack on the sympathetic system brings brilliant results in vascular lesions where permanent dilatation is beneficial. It may also be said that certain lesions affecting the viscera respond to surgery by alterations of their non-striated musculature.

TREATMENT OF PROSTATISM BY ENDOSCOPIC REVISION*

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For the purpose of this paper the term prostatism is used to include all of the symptoms and lesions produced by obstruction to urination in the posterior urethra. The basic anatomic lesions may be adenoma, carcinoma or fibrosis of the prostate. Because of the obstruction that they produce, secondary changes occur in the bladder, ureters and kidneys, and perhaps also in the cardiovascular, digestive and nervous systems. The disease seldom occurs before the age of 50 years and a few cases come under treatment before the age of 65 years. Because of lack of appreciation of the hazards of neglect, or of those of operation, patients do not ordinarily present themselves until relief of the obstruction has ceased to be a matter of election and has become one of urgence. Thus, by the time a patient comes under supervision, to such inevitable consequences of old age as extreme grades of cardiovascular disease have been added widespread urinary infection and deficient kidney function.

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* Read before the Society March 9, 1932.

Notwithstanding these handicaps, studies of functional capacity, means for combating infection and progress in anesthesia and operative technic have made the operative mortality for prostatectomy less than 10 per cent quite the rule.

The history of efforts to remove posterior urethral obstructions by endourethral instruments began before the discovery of anesthesia and asepsis early in the 19th century. Not even mention can be made here of the many who have contributed to it. The apparatus used at present has been developed by men who are still living. High lights are the work of Young, Caulk, Collings, and Davis. Their instruments permit visual control of the operative area, and as electro-surgery has been developed in other fields, it was applied to endourethral prostatic surgery. To Caulk and to Davis belong the credit for showing that endourethral operations, formerly limited to fibrosis and carcinoma, might be applied to adenomata with permanent relief of the obstruction.

In 1924 Dr. Joseph F. McCarthy invented a cysto-urethrascope with a straight tube and for-oblique vision. At the meeting of the American Urological Association in 1931 he described a non-conducting bakelite sheath and electrode to be used with this telescope, and a new radio-tube cutting apparatus of great range and flexibility. This outfit presented the following advantages over the apparatus formerly used for this purpose: (1) the non-conducting sheath is open at the bladder end, giving better vision and permitting longer bites of tissue, (2) the telescope gives a foroblique view of the obstruction instead of direct, so that the obstruction is viewed as though from an elevation instead of on the same level as with the direct instrument, and (3) the cutting current is of great rapidity and has an extensive range, so that hemorrhage is slight and easily controlled. With these advantages in the instrument a high degree of technical skill is not essential for reasonably safe and efficient manipulation.

Patients are prepared for revision as for prostatectomy. When in good condition cystoscopy is done to determine the characteristics of the enlargement and to discover any complication that may contraindicate revision. Cystoscopy also gives a rough test as to how the patient may stand urethral instrumentation. If no contraindications are developed, revision may be done 48 hours after cystoscopy.

Under sacral anesthesia the bakelite sheath is introduced into the bladder, and the telescope and cutting loop inserted. On withdrawing the instrument, the prostatic margin and posterior urethra come into view and can be readily studied in the brilliant illumination afforded. The verumontanum is located and mental note made of the areas to be resected. The loop is then advanced and placed over a part of the tissue to be removed. As it is drawn back, the cutting current is turned on with a foot switch and the tissue removed under inspection. The field is kept clear of bubbles and blood by inflow of solution from an irrigator. Bleeding is usually slight and may be readily controlled by a coagulating current with the cutting or with a special electrode. Sufficient tissue is removed to give reasonable assurance that a free channel has been obtained, and a large indwelling catheter is placed through the cystoscope in order to avoid traumatizing the cut area as much as possible. This is an important precaution lest hemorrhage result from mechanical removal of coagula from the cutover areas. At the finish bladder washings should be almost free from blood.

There is seldom any shock following revision, the majority of patients going along without interruption in their routine except for a stay of a few days in bed. Hemorrhage is a complication which must be looked for constantly and carefully and combated promptly on general indications.

On the morning of the third day, the catheter is removed and the patient encouraged to urinate. If he fails, the catheter is replaced and left in place for 4 days more; if he again fails to void on its removal, another revision is considered and undertaken if deemed necessary.

The most cogent objections to endoscopic revision in adenomatous prostates are: (1) that the operation fails to completely remove all of the obstructing tissues and that, therefore, recurrence of the obstruction may follow, and (2) that hemorrhage may be brisk and uncontrollable. To each of these I agree, but with reservations. Removal of glandular tissue is incomplete but it may be made sufficiently extensive to permit a free passage of urine, and recurrence has not been observed either by Caulk or by Davis, who have had experience with the greatest number of cases and over the longest period of time. If it should occur, there is no reason why a second revision may not be done. Hemorrhage is a real danger in revision just as it is in prostatectomy. Fear of it does not deter us from performing the latter, nor should it from doing the former if the danger is recognized and steps for its prompt recognition and correction taken.

Shortly after seeing Dr. McCarthy revise two cases at the Post-Graduate Hospital in New York in October 1931, I was enabled to begin using the method at Georgetown University Hospital. I entered upon the work believing that it would be worth while, if one-half of the cases presenting themselves for treatment could be relieved by it and spared prostatectomy, even though the remainder might have to have multiple revisions or even prostatectomy later. I did not think that it was absolutely innocuous and so was prepared to have and to meet surgical complications. The good results have equaled my hopes; there have been a minimum of surgical complications.

The first case was in a negro 56 years of age who had come in with incontinence of retention and who was in poor general condition. After 19 days of indwelling catheter drainage, revision was done and several large bits of tissue removed. On removing the catheter he was unable to void and 9 days later a second revision was done. After this he was able to void readily and his residual urine on leaving the hospital five days later was 1 ounce. Despite visits to his residence we have not been able to locate him since.

Since then we have revised 12 cases presenting an average age of 66 years with the extremes of 48 and 83 years. There were 3 cases of carcinoma in the group; the remainder were adenomata of greater or lesser size. Seven had complete retention on admission and the remainder had a residual urine of from 10 to 500 cc.; all had definite obstructive growths as revealed by cystoscopy. Microscopic examination of the tissues removed has shown either adenoma or carcinoma in each instance.

I lost 1 case, a man 72 years of age, who was cystoscoped and whose prostate was revised at one sitting as a concession to his aversion to cystoscopy. Twenty-four hours after revision he was quite comfortable and in good condition. Three hours later he began to void urine around the catheter and bled a little. When I was called 30 hours after the operation he was semi-comatose with rapid pulse and respiration. His mucous membranes were not blanched, the bladder was not distended and urine that was only slightly blood-tinged was obtained on catheterization. Washings failed to secure either clots or very bloody urine. The hemoglobin was 70 per cent (Dare) and the erythrocytes numbered 3,700,000 per cubic millimeter of blood 40 hours after operation. Despite supportive treatment he lost consciousness and died from what was probably circulatory collapse 48 hours after operation. Necropsy was refused. I believe that this death might have occurred irrespective of whether revision had been done or not. I doubt that the loss of blood sustained had anything to do with it, but blame myself for not having done a preliminary cystoscopy to test his reaction to instrumentation before proceeding with revision. Had I done this I believe that I might have had a death following cystoscopy and have avoided one following revision.

A second accident occurred in the ninth case, a man of 70 years, with complete retention. One revision was done without favorable result and 1 week later a second. His catheter did not drain well and was changed instead of being irrigated frequently as had been ordered. Six hours after revision the catheter was not draining and his bladder was distended. Since catheters and an evacuator became plugged with clots I did a suprapubic cystotomy, finding a large mass of soft clot in the bladder. The prostatic bed resembled one in which a prostatectomy had just been done by enucleation. A few remaining nodules in the right lobe were removed. The patient's convalescence was uneventful and he left the hospital 26 days after operation. I believe that in this case the bleeding was caused by passing a catheter over the very fresh wound surface, thus dislodging a recent clot. It might have been prevented had the catheter been irrigated as directed, instead of changed.

A third unsatisfactory result (Case 10) occurred in a feeble man 83 years of age with a large carcinoma in an adenomatous prostate. After 3 revisions and a course of deep x-ray therapy he was unable to void and a suprapubic fistula was made.

A fourth case (Case 4) with carcinoma and osseous metastases developed retention for which a cystotomy was done out-of-town about 10 weeks after revision. He died a few days later, apparently from pulmonary embolism.

The remaining 9 cases (Cases 1, 2, 3, 6, 7, 8, 11, 12, 13) have done uniformly well. None has had residual urine of more than 120 cc. on discharge from the hospital, and a month later it has been considerably less, usually none at all, in each patient whom we have been able to follow. The nocturia has been 3 times or less in each instance. The time in hospital after a single successful revision has been short, averaging 6 days with extremes of 4 and 8 days. In the 3 cases in which multiple revisions have been necessary for success, the time after the first revision has averaged 15 days, with extremes of 16 and 21 days. This compares very favorably with suprapubic prostatectomy in which the fistula often lasts for 3 weeks or longer after enucleation.

The criteria of success in the treatment of prostatism are a relative freedom from frequent painful urination and the absence of more than a negligible amount of residual urine. If this can be obtained by a safe endourethral procedure, prostatectomy will be unnecessary and the patient spared a long period of hospitalization and one or more operations.

Since there are so many variants in prostatic patients, chance occurrences may distort the percentages even in large series, so that it is evident that my small series of 13 cases is not sufficient to thoroughly evaluate the McCarthy method of revision. The fact, however, that 9 of the 13 have been made comfortable and have had their residual reduced or eliminated altogether by it, indicates that it has a field favorably comparable to that held by prostatectomy. I believe that its use should be given careful consideration in every case of prostatism coming under observation. Each operator will have to work out his own limitations, and these will depend largely on the adequacy with which the nursing and operating personnel at his command can afford help with sufficiently prolonged anesthesia, and by prompt recognition and intelligent treatment of postoperative complications, especially hemorrhage. It cannot supplant prostatectomy altogether but it will save a number of patients from it.

In cases with small fibrous bars it will undoubtedly be simpler and safer than the methods in use heretofore. In small and medium-sized adenomata it will afford relief in the majority of cases, while some large adenomata will require multiple revisions and still others prostatectomy. In carcinoma my results have been disappointing. In 1, relief has been permanent, in 1 temporary, while in the third no satisfactory results were obtained and a suprapubic fistula had to be done.

The shortened period of convalescence will appeal to all concerned. In view of the reduced time of hospitalization, physicians will hesitate less in recommending, and patients will not defer so long in accepting revision as they will prostatectomy. Since it presents a less formidable and time consuming procedure than prostatectomy, urologists may be inclined to use it rather than prostatectomy in borderline cases with little prostatic enlargement and few symptoms. In poor risks it will undoubtedly enjoy a vogue because of the lack of shock following it.

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DISCUSSION

Dr. H. A. Fowler: We are indebted to Doctor LeComte for bringing before us this relatively new procedure which has caused more discussion in the urological world than any subject in recent years. I recently visited the clinics of Dr. T. M. Davis at Charlotte, N. C. and Dr. McCarthy at the New York Post-Graduate Hospital, two of the foremost advocates of resection. I was impressed by the large number of urologists in attendance, as well as the interest manifested in talks with these men. There seems to be no unanimity of opinion as to the best method of relieving obstruction of the prostate. The perineal enthusiasts have their followers, as do the suprapubic prostatectomists. In recent years different methods of attacking the urinary obstruction have been proposed, among which is the one now under discussion. Botini first appeared on the scene with his prostatic incisor, which was soon discarded. Since that time different modifications have been suggested by Young, Caulk, Collings, Stern, Davis and McCarthy. Recently Davis has reported a series of over 300 cases of prostatic obstruction relieved by transurethral resection with but 2 deaths. This astoundingly low mortality in these feeble old men merits our admiration. This procedure demands an exactness of skill probably not possessed by the average instrumenteur, so that doubtless unfavorable reports will be made as the method increases in popularity. This should not deter us, since in the early days of open prostatectomy the mortality was very high and only in recent years has the mortality been reduced to 3 to 5 per cent.

In 1926, while attending the Boston meeting of the A.U.A., I saw the work of Collings with his electrotome. I purchased one and resected some median bars at that time with very good success. However, due to the lack of control of hemorrhage, I felt that this method was not without danger and reluctantly abandoned transurethral resection despite the fact that I thought it had a definite place in urological surgery.

Stern, in 1927, developed his resectoscope but with indifferent success, and it remained for Davis to develop and perfect the present technique of resection. Recently, McCarthy has devised an electrotome for prostatic resection. However, this method has two striking defects, the first being that the loop is not rigid and has a tendency to spring over tissue rather than cut through it. The second objection is that the coagulating current is far from satisfactory in controlling bleeding, and the instrument has a marked tendency to crawl while the cut is being made. His foroblique observation sheath seems superior to the Stern instrument, whereas the control of bleeding is much better with the Davis technique. I have employed the McCarthy instrument in approximately 20 resections and have noticed the defects as above outlined. I have more recently purchased a Stern resectoscope and feel that it will be more satisfactory. By more adequate control of bleeding the results will outweigh those achieved with the McCarthy technique. A note of warning should be sounded in that prostatic resection is no minor surgical procedure and should not be advised lightly. It has a definite mortality as has any procedure on an old debilitated patient. In my hands the mortality of the open operation has been 2.5 per cent in a large series of cases, whereas in resection a death occurred which was undoubtedly from resection. The guide to the secret of successful resection is in control of hemorrhage at every step of the operation, which to my mind can better be done with the spark gap or Davis technique, as the coagulation is much deeper.

The contraindications to resection are rather definite and clear cut. It is generally agreed that it should not be used in the large mushy, vascular Type IV prostate, and it is my opinion that it should not be used in very old patients unless the degree of obstruction is very slight. In Types I, II, and III, and in the fibrous bar or contracture, and in median lobes when the patient is properly prepared and the obstruction oriented by cystoscopy, and in carcinoma, this method has a definite field.

One is frequently asked, "What is the probability of recurrence?" The likelihood of this happening has been overemphasized, as Davis and others report a negligible recurrence. Davis operated on 27 patients in whom recurrence followed prostatectomy, and in only 1 case following resection. Sections from these resected obstructions show a preponderance of inflammatory tissue, round cell infiltration and other evidence of an inflammatory reaction, so that following removal of the obstruction with post-resection treatment, this inflammatory hyperplasia tends to involute. Even if one had to perform an occasional resection for recurrence, it could be done more easily than an operation for recurrence from a prostatectomy. As one becomes more accustomed to the technique the number of second operations necessary is greatly reduced.

Further discussion participated in by **Drs. W. Calhoun Stirling, Francis R. Hagner** and **H. N. Dorman.**

THE PRINCIPLES OF TREATMENT OF STRABISMUS*

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The very earliest medical writers noted the presence of strabismus, and the subject is a time-worn one. In spite of this antiquity it is worthy of our earnest consideration since the literature is so vast and the opinions so diverse that great confusion exists. While many points in the treatment of this condition are thoroughly understood and almost universally followed, others equally important are ignored by the majority of ophthalmologists.

Strabismus like many other conditions is produced by a variety of causes, and the only intelligent treatment is that based upon the etiological factor.

According to Duane there are three etiological types of squint: "(1) The congenital form, primarily muscular and peripheral in origin; (2) the later acquired form, due to a convergence or divergence anomaly; and (3) the mixed form, in which, added to a congenital muscular deficiency, there is later superadded an anomaly of convergence or divergence."

Most vertical deviations and some lateral ones belong to the first group of cases, which are characterized by a variability in the amount of the deviation present in the different directions of gaze and other signs indicative of muscular paralysis.

To the second type belong the lateral deviations resulting from anomalies of convergence or of divergence. This group comprises a large percentage of concomitant squints, the evolution of which has been traced by Duane through the following stages: (a) A pure anomaly of convergence or of divergence; (b) an anomaly of convergence associated with a consecutive anomaly of divergence, or vice versa; (c) cases of class (b) which have progressed to the point at which consecutive muscular changes due to continuous overaction of one set of muscles and continuous underaction and stretching of the opponents have set in.

The third type is frequently encountered and is but a combination of the first two types.

For the segregation of our cases into these groups a careful history and a detailed examination are essential. Proper questioning will often bring out points of differential value. For example, the duration of the deviation or of symptoms that indicate one is extremely helpful. Such symptoms as head tilt or the closing of one eye are strongly suggestive of the presence of a muscular imbalance. Head tilt in ocular deviations has been recognized for many years, having been first described by Cuignet in 1871. Although much has been written on it since then one still finds its presence constantly overlooked, particularly when the tilt is slight. Theoretically there is a characteristic position of the head for every type of muscle paralysis. Some authorities attempt to diagnose the muscle involved from the position of the head, and while certain general rules can be followed too many factors enter into the problem for this to be a thoroughly reliable guide. Usually the head is tilted so that binocular single vision is obtained, but occasionally it is twisted in the opposite direction. In this way the separation of the images of the two eyes is increased and suppression of the false image is made easier. Knowledge of the constancy of the deviation, of the effect of glasses or of intercurrent diseases on the squint may also aid greatly in the treatment.

More important than the information obtained from the history is that secured by a careful measurement of the deviation. Accurate estimation of the amount of the deviation cannot be obtained by any of the commonly employed methods, such as the perimeter test or the Priestly Smith tape test, which rely upon the position of the corneal reflexes. These methods all give only an approximate idea of the amount of the deviation. They cannot be used to measure a vertical and a lateral deviation simultaneously, nor can they show the varying amount of the deviation in different directions of gaze. They should be used only in cases in which the loss of power of fixation in one eye precludes accurate measurement of the deviation by the screen test. The screen test is by all odds the most accurate one. Its use is time-consuming, but the knowledge it gives is worth the added effort. By it one can determine not only the amount of deviation present for distance and for near vision, but also its behavior in the six cardinal directions of gaze.

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This test is also useful in differentiating a pseudostrabismus from a real deviation. The absence of any movement as the cover is carried from one eye to the other is definite proof that no real deviation exists and that the condition is only an apparent one. Pseudostrabismus is commonly encountered in children, and while its detection is an easy matter it is frequently overlooked. A review of the anatomical reasons for its presence is proper. The child's nose has a broad and flat appearance, the bridge of it being underdeveloped. The skin of the nose instead of being tightly adherent to it, is loosely attached, except at the inner canthal ligament. This laxity of attachment may permit the skin to hang in a vertical fold, producing a condition known as epicanthus. The inner canthi are farther apart than normal. This increased distance between the inner canthi is caused by two factors—first, the looseness of the attachment of the skin to the underlying bones, and second, the underdevelopment of the bridge of the nose. The position of the eyeball in the orbit is normal and the distance between the nasal orbital walls is no greater than normal. This loosely attached skin, therefore, covers a part of the nasal portion of the sclera on either side giving the patient the appearance of having a convergent squint. As the bridge of the nose develops the skin is drawn inward and forward. In this way the deformity is corrected. A cure then is simply dependent upon full facial development. I can not stress too strongly the importance of recognition of this condition. The failure of physicians to appreciate this facial change is partly responsible for the very widespread belief that a squint will correct itself. I have known of several cases in which glasses have been prescribed to correct the squint when only this apparent condition existed.

The reverse condition of apparent divergent squint is occasionally seen in persons who have a particularly high, narrow nasal bridge. In these cases the skin is stretched tightly over the bony structures and more than a normal amount of scleral tissue is exposed on the nasal side of the limbus. This condition demands no treatment and is rarely marked enough to be disfiguring. Sometimes an actual deviation is made to appear much worse by the simultaneous presence of a pseudo squint.

From these considerations, it can be said that accurate measurement of the amount of the deviation is the first step in the treatment of strabismus, and that the screen test is the test par excellence for obtaining this information.

It is universally accepted that one of the first essentials in the treatment of strabismus is the correction of the refractive error which has been carefully determined under complete cycloplegia. The importance of this teaching need not be stressed for all are familiar with many cases that have responded to glasses; yet on the other hand with this treatment disappointing results are frequent. Among this latter group are the congenital cases, the cases of divergent squint associated with hyperopia and the squints with negligible errors of refraction, all of which are conditions uninfluenced by refraction. With the proper diagnostic methods and a small modicum of common sense a correct prognosis can be given and the useless wearing of glasses avoided.

Treatment to prevent amblyopia ex anopsia is another well established and generally adopted practice about which little need be said except to urge its more conscientious use.

The value of orthoptic exercises designed to stimulate the fusion sense is a much mooted question. In my opinion it is an important adjunct but not the panacea for all muscular troubles that some maintain. Its use requires intelligent coöperation and painstaking supervision. Many times the intelligent coöperation is present but the stress of practice interferes with the painstaking supervision, and then again in spite of our most earnest efforts the coöperation is practically nil. Its use postoperatively and in slight deviations is sometimes of great value in securing useful binocular single vision.

These non-operative measures are successful in some cases, while others are not influenced by their use. In these we have to resort to surgery. However, before operation is considered one must have full information on the effect of these measures, and in addition accurate knowledge on the precise kind of deviation present and the nature of the underlying pathological condition. Furthermore, one must be familiar with the symptoms produced by muscular deviations and must carefully consider the prospect of relieving them by operation.

The most frequent symptom demanding operation is disfiguring squint. Head tilt and diplopia are occasional reasons for operating.

Although disfigurement produced by a pronounced squint is familiar to all, how many have actually considered the deleterious effect of such a cosmetic blemish upon the physical and mental development of a child? The cross-eyed child is an object of derision by all his playmates, who are merciless in their remarks. This constant nagging and the physical combats it produces can only be avoided by seclusion. He, therefore, shuns society and finds relaxation in his books. At home his zealous parents constantly remind him of his weak eyes, urge him to be careful of the light, not to read too much, and in a thousand other ways keep his defect foremost in his mind. Furthermore, he is shielded from all unpleasant situations and granted every whim. The mercilessness of his playmates is no worse for him than the love and sympathy of his parents. It is no wonder then that these patients become self-centered, eye-conscious, neurotic individuals. All of this can be avoided by the early removal of the squint. As Duane has said, it may take several weeks, even months or rarely as long as a year or two to decide that operation is indicated, but "our decision once made I see no reason for waiting. Usually the longer we wait the more unfavorable for operating the condition becomes. Overtense muscles become rigid, overstretched muscles become enfeebled, and the ability of the eyes to perform fusion, or what is still more important to overcome diplopia, becomes less."

The difficulty in gauging the effect while operating under general anesthesia is the common argument used in favor of postponing operation. This is true to a certain extent, yet if the pre-operative study is a thorough one the results are surprisingly good and the few mistakes in judgment can be readily remedied by a second operation. To my mind the ideal time for correction of a strabismus is prior to the school age, for then the taunts of playmates are avoided and the child enters school on an equal footing with other children.

The selection of the type of operation to be employed does not depend so much upon the direction of the deviation as on its essential nature. As previously stated lateral deviations largely result from an anomaly of convergence or of divergence or combinations of these two. Accurate measurement of the deviation for distance and for near will determine the causative factor and greatly aid in the selection of the proper operative procedure. For example, if one is dealing with a convergent strabismus present only at close range the causative factor is a convergence excess, and the operation of choice is one designed to weaken this power. On the other hand, if the deviation is present only on distant fixation, the choice should be a procedure to strengthen the power of divergence. Usually in long standing cases both conditions prevail, necessitating both types of operation.

The vertical deviations are practically always of paretic origin and with these a careful analysis of the behavior of the deviation in the six cardinal directions of gaze is essential. Without this knowledge the diagnosis cannot be accurate and the selection of the proper operative procedure is impossible. The combined vertical and lateral deviations are not uncommon, and the general rule to be followed is to correct the vertical deviation first and later if necessary to remove the lateral squint.

Every opthalmologist has his own ideas about the best operative technique for either weakening or strengthening a muscle. Suffice it to say that whatever technique is used matters little in comparison with the importance of knowing when to weaken and when to strengthen. This decision can only be reached by a careful analysis of each case as it presents itself.

Summary

In this brief resume of the treatment of strabismus the following points have been emphasized:

1. The necessity for a proper etiological classification of squint cases.
2. The usefulness of the screen test as a method of accurate measurement of the deviation.
3. The frequent presence of pseudostrabismus and its differentiation from an actual deviation.
4. The importance of early operation because (1) the conditions for operating are more favorable, and (2) the strabismus exerts a profound effect upon the mental and physical development of the child.
5. The selection of the proper operative procedure depends not so much upon the direction of the deviation as upon its essential nature.

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THE PLACE OF ROENTGENOLOGY IN OBSTETRICS*

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The use of the X-ray as an aid to obstetrical and gynecological diagnosis and investigative study is assuming an increasingly important place almost daily, as is evidenced by the fact that this subject was the first order of the day at the Seventh Congress of the Association of French Language Gynecologists and Obstetricians, held at Bordeaux last October. I shall not deal here with the application of this science to gynecological diagnosis, either unaided or after the production of pneumoperitoneum or with lipiodol injections of the generative tract, but will consider only its application to obstetrical problems. Of these, none is assigned a place of greater importance by most obstetricians than that of pelvimetry and mensuration of the fetal head. As early as 1899, Fabre began the study of the possibilities of the X-ray in this connection, and he has been followed by many earnest investigators including Thoms, Coe and my own associate, Dr. J. Bay Jacobs. The difficulty encountered by all investigators has been to avoid distortion of the superior straight on the photographic plate, but the work of the students just mentioned bids fair to overcome this drawback entirely. While a method capable of presenting an exact picture of the interior of the pelvis drawn to an accurate scale, particularly if combined with measurements of the fetal head, is very desirable, I have never been able to see in it the practical importance some men do, because in a given problem of labor in a patient with a contracted pelvis, two factors, the ability of the head to mold and the character of the uterine contractions, are undeterminable in advance and of almost equal importance in the prognosis. For instance, I have recently seen a private patient who had been told at two of the foremost obstetrical clinics in this country and at one in Paris that she would inevitably require a cesarean section because of atypical pelvic contraction, go through a perfectly normal, short, spontaneous labor with a live baby of average size.

The radiographic diagnosis of pregnancy depends, with exceptions to be noted presently, upon the detection of shadows thrown by the centers of ossification in the fetal skeleton. The first of these appear in the clavicles at about the 35th day, shortly afterwards in the two halves of the lower jaw, and not until the 9th week in the pelvis and vertebral column. How soon then may these increasingly numerous centers be detected practically? According to Henrotay, Jungmann of Vienna, using a compressor, claims to have made the diagnosis as early as the 10th week; Walther, at the 11th week; Leiser, at the 14th week; Faverau, at the 3rd month, etc. In 1921, Bartholomew, Barnes and Galloway, however, subjecting the same women to regular radiographic study from the beginning of pregnancy, were able to make a positive diagnosis at the end of the 5th month in only one-third of the cases. Again, according to Henrotay, at the present time only insufficient or faulty technique should prevent the positive radiographic diagnosis of pregnancy at the fifth month. Diagnosis before ossification was first attempted by Carlos Heuser of Buenos Aires by the intra-uterine injection of lipiodol to outline the embryo. This author states that he has never seen abortion follow this procedure, and Jarcho, Jaroschka, Rucker and Whitehead and others state the dangers are minimal. Recently, Nahmmacher, attempting to induce therapeutic abortion in seven cases by the intra-uterine injection of iodized oil, was successful only twice. Despite these findings and the diagnostic success of the procedure, this method of diagnosis is considered too dangerous by most authorities and probably should not be in competition with the Ascheim-Zondeck test which is diagnostic much earlier. The same may be said of the recent attempts of Albano in Pestalozza's Clinic in Rome to render the early embryo opaque to the X-rays by the intravenous injection in the mother of 30 cc. of a 10 per cent solution of tetraiodophenolophthaleinate, which it was believed would traverse the placenta and accumulate in the amniotic sac.

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* Section of paper read before the Clinico-Pathological Society January 19, 1932.

In cases in which the duration of pregnancy is in doubt, attempts have been made to determine this by X-ray study by observing the centers of ossification present and checking these against their known time of appearance. It has even been suggested that the prenatal diagnosis of sex might be made radiographically, since Prior claims that the centers of ossification of the skeleton of the female fetus appear sooner than in the male. It may conservatively be said, however, that these methods are still undeveloped.

In cases in which the diagnosis between tumor and pregnancy remains in doubt, or in which the question of the possible association of pregnancy with a recognized tumor is uncertain, the X-ray has proved to be an invaluable aid. Unless very skillful in reading such plates, however, even the roentgenologist may be led into the serious error of making a diagnosis of pregnancy because of shadows thrown by calcified fibroids or presence of bone in dermoid cysts.

In my own hands, the most frequent recourse to X-ray study has been adduced by a desire for certainty as to the presentation, particularly before undertaking external cephalic version for the conversion of breech presentation in primiparae, to confirm the diagnosis of multiple pregnancy and to be enabled to give the prospective mother positive assurance of the absence of gross fetal abnormality. Of three women recently under my care, two had previously given birth to anencephalic monsters, and one to a baby born with one arm missing below the elbow. X-ray plates in the second pregnancies of all of these patients showed the fetus to be normal, and these women spent the latter part of their pregnancy in a much happier frame of mind than before the roentgenologist assuaged their fears. The babies were all normal at birth. The diagnosis of hydrocephalus is also readily established roentgenographically, and it has even been suggested that early study of a large number of cases might result in allowing definite decisions as to whether anencephalus is due to early rupture of the hydrocephalic head of young embryos. Indeed, so valuable has the X-ray proved to be in this connection that I have often thought it would be advisable to have at least one routine X-ray examination during the course of every pregnancy; such a study should certainly be made of every patient presenting evidence of hydramnios, which is so frequently associated with serious fetal deformity. The positive diagnosis of a definitely abnormal fetus could then be followed by prompt termination of the pregnancy, thus saving many possible dangers of full-term delivery and a great deal of unhappiness for the parents. Along such lines as these lie some of the likely advances in ultra-modern obstetrics.

But these triumphs of the X-ray in obstetrical diagnosis do not exhaust its possibilities. It has proved also to be of great value in determining the presence of a dead fetus. In making this diagnosis the roentgenologist detects the sign of Spalding, namely overlapping of the bones of the fetal skull, beginning decalcification of the fetal skeleton, and abnormal angulations of the fetal spine due to loss of tonicity of the supporting muscles. It is interesting to note that one of the first plates of the fetal skeleton in situ was obtained in 1898 by Imbert in a case of extra-uterine pregnancy between the 5th and 6th months. In a recent ward case from my service at Columbia Hospital for Women, which was believed by the majority of the staff members examining the patient to be an abdominal pregnancy nearing term, Dr. Christie reported the baby in the uterus and subsequent events proved him to be correct. The X-ray, therefore, is of great help in diagnosing late extra-uterine pregnancies, and when combined with the intrauterine sound or lipiodol injections, the conclusions are definite. By this method hydatidiform mole has also been successfully diagnosed.

It may seem strange to the uninitiated, but there are still many points about the mechanism of normal labor which are imperfectly understood, and recently the employment of the X-ray during labor bids fair to throw much light into these dark places. So important has this study become that several large atlases of such plates have been published in Europe.

In connection with the therapeutic use of the X-ray during pregnancy, reference may be made to the production of therapeutic abortion by this means, quite extensively practiced at Mt. Sinai Hospital. With certain patients, notably those with active tuberculosis, in whom freedom from shock and the effects of an anesthetic are deciderata, this procedure has much to commend it. It would seem advisable, however, to exercise extreme caution in its use in individuals in whom subsequent pregnancy is to be permitted, for it may be pointed out that in employing radium and X-ray therapy in treating or diagnosing pelvic disease of the woman of child-bearing age, the roentgenologist should have ever in mind the possibility of fetal deformity resulting from the fertilization of ova exposed to these powerful agents, a possibility which has been proved in animals, at least. He must also remember the fact that his agencies can effect castration quite as efficiently as the surgeon's knife, and that his brand of castration carries in its train the same consequences to the psychic and sexual life of the patient.

In one case of hyperthyroidism in a private patient of mine X-ray treatment promptly arrested a quite gravely threatening situation and permitted the pregnancy to proceed to a normal and happy termination; the employment of this agency in treating this complication of pregnancy seems to have much to commend it over surgical intervention.

In conclusion one may say that the physician handling obstetrical patients will do well to keep in mind the ever increasing help to be obtained from the roentgenologist in solving many of his problems of diagnosis and therapeusis. To do otherwise is to deprive expectant mothers of one of the helpful resources of modern medicine.

Note: A comprehensive bibliography of the subject is contained in the following article, which forms the basis of this paper.

Henrotay, J. L.: Le Radio-diagnostic obstetrical, Gynec. et obst., 1931, **24**, 265–298.

EMPYEMA IN A NEW-BORN INFANT DIAGNOSED DURING LIFE

Janvier W. Lindsay, M.D., E. Clarence Rice, M.D., and Maurice A. Selinger, M.D.

In a recent review of empyema of the newborn Glaser and Epstein state that the condition has received little attention in textbooks on diseases of children and according to the literature is relatively rare. This apparent rarity is more apparent than real in their opinion, since in a series of seven necropsies on infants under three weeks of age who died of pneumonia, unsuspected empyema was found three times. Our own experience has been that the condition is of rather rare occurrence. However, a relatively large number of cases of empyema in the new-born found at necropsy has been reported in the literature.

Diagnosis during life is most unusual due to the fact that the incompletely developed nervous system does not react to stimuli as does that of the older child. Symptoms are few; physical signs are inconstant, and sometimes it is impossible to elicit them. We can agree with Glaser and Epstein in their observation that only by keeping the possibility of empyema in mind will the diagnosis in the new-born be made. Roentgen examination of the chest is the greatest diagnostic aid together with diagnostic puncture of the pleural cavity.

The difficulties in diagnosis are apparent when one realizes that only four cases of empyema diagnosed during life in the new-born have been reported. The authors mentioned have collected three cases and added a fourth. The case we are reporting represents the fifth case on record. Table I gives some of the salient data of these five cases.

TABLE I

AUTHOR	AGE AT ONSET	ORGANISM	TREATMENT	RESULT
	Days			
Devraigne	19	Streptococcus	Thorocotomy	Recovered
Rummel	4	Streptococcus hemolyticus	Aspiration	Died
Spence	14	Staphylococcus aureus	Continuous siphon drainage	Recovered
Glaser and Epstein	12	Staphylococcus aureus	Aspiration	Died
Lindsay, Rice and Selinger	4	Pneumococcus	Aspiration	Died

REPORT OF CASE

The mother of the infant, a colored female, aged 21 years, was admitted to Garfield Memorial Hospital on the obstetrical service of Dr. R. L. Silvester on January 29, 1931. She had had 3 previous pregnancies with normal deliveries, and the children were alive and well. At the time of admission she had a "cold." Her temperature was 100.0°, pulse 88 and respirations 20. She complained of pain in the right side of the chest and 2 hours later pain in the left side of the chest. Four hours after admission and 23 hours after the onset of labor an apparently normal male infant was delivered without difficulty. Three hours after delivery physical examination of the mother gave evidence of consolidation of the upper lobe of the right lung with probable involvement of the other lobes of this lung. A pleural rub was also heard at the right base. From this time on the mother was seriously ill. Two days after delivery she developed thrombosis of the left femoral vein. During her illness she was irrational at times, and there was evidence of cardiac embarrassment. Death occurred suddenly on the 15th day after delivery, apparently from pulmonary embolism. Necropsy was not permitted. Sputum obtained was not satisfactory for examination and contained considerable saliva. Smears contained streptococci, fusiform bacilli and spirilla. Blood culture taken on the 5th day gave no growth. The leucocyte count varied between 43,900 on the 4th day and 15,400 on the 14th day.

The baby weighed 6 pounds, 4 ounces at birth and for the first 3 days appeared to do well, during which time he lost 6 ounces. Due to the illness of the mother, he was placed on a formula and isolated from her. On the 4th day he cried a great deal and the temperature varied between 99.0° and 100.8°. Clinicians suspected the presence of pneumonia. Roentgen examination of the chest showed "the heart to be displaced to the right, there being a compensatory emphysema of the right lung. There is a uniform opacity of the entire left chest with obliteration of the left costophrenic angle and what is believed to be a fluid line along the periphery of the left chest; this appears to represent fluid in the pleura, with a possibility of an underlying pneumonia." (Fig. 1.) The left chest was aspirated and a small amount of purulent fluid secured, culture of which gave no growth. The diagnosis of empyema was made. On the same day the patient was transferred to Children's Hospital. When admitted, the child had a grunting type of respiration, breath sounds were tubular and there was slight dullness over the left lower chest posteriorly. The temperature averaged 100.8°. On the 6th day toxemia increased and dehydration was noted. Food was vomited and dyspnea and cyanosis were intense. The pharynx was injected. Dullness and flatness were elicited over the right chest, breath sounds being increased above the scapula and absent below. Resonance was impaired over the left chest. Heart sounds were weak and rapid. The abdomen was distended with gas. Roentgen examination of the thorax revealed a generalized bronchitis. No fluid was obtained on aspiration. Death occurred 6 days after birth. The clinical diagnosis was bronchopneumonia, empyema and atelectasis. At necropsy, 18 hours after death, a bilateral empyema was found. The right lung was covered with a thick greenish exudate and the diaphragmatic pleurae were found together by light adhesions. The posterior surface of the left lung was covered with a similar exudate. The surfaces of the lungs were injected and numerous areas of atelectasis with superimposed bronchopneumonia were found. On the epicardium a number of hemorrhagic areas were seen. The heart was normal except for a patent foramen ovale and ductus arteriosus. The liver was enlarged and congested and on microscopical examination almost complete replacement of hepatic tissue by fat was noted. The spleen, adrenals and kidneys were congested. A pneumococcus and staphylococcus albus were obtained by culture from the right pleural cavity, the pneumococcus from the left pleural cavity and a gram positive spore-bearing bacillus from the heart's blood.

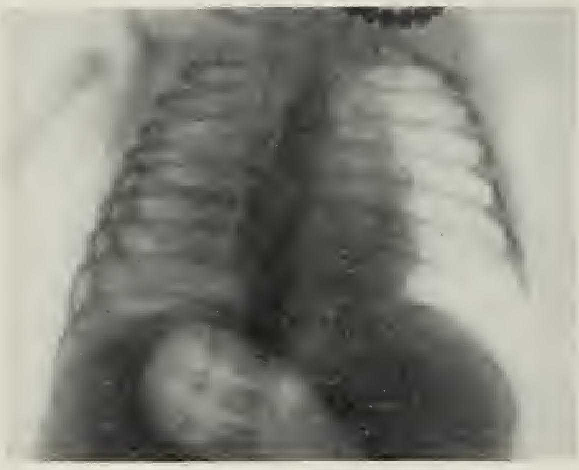

Fig. 1. Roentgenogram Showing Presence of Fluid in Left Side of Thorax Displacing Heart to the Right

Comment

It is quite possible that the infant was infected in utero, since the mother evidently had pneumonia on admission to the hospital. After birth the child was isolated from the parent and there was no further contact. Infection in the birth canal is a possibility. Although the pneumococcus was not found in the sputa obtained from the mother, this was probably due to the fact that they were improperly collected and came from the mouth rather than the lung. There is little doubt that the pneumococcus was the infecting organism in both mother and child.

The authors are indebted to Drs. R. L. Silvester, Charles B. Crawford and Edgar P. Copeland for the privilege of reporting this case.

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SUBCUTANEOUS INTERSTITIAL EMPHYSEMA DURING ANESTHESIA*

Report of a Case

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Subcutaneous interstitial emphysema during the administration of a general anesthetic is so rare a complication that the following report should be of interest. Scattered cases have been reported following trauma of the face and trauma of the chest, an occasional case following tonsillectomy, and one following a tendon transplant.

Subcutaneous interstitial emphysema is that condition in which air or other gases are found in the subcutaneous tissues.

The varieties are of four types:

1. Inflammatory or gangrenous, caused by infection with the gas bacillus of Welch.
2. Congenital, occurring in infants with congenital weakness of the lungs, and induced by coughing.
3. Spontaneous, which may occur after the extensive extravasation of blood into the tissues, when it is due to gas produced by acids, such as lactic acid, acting on the contained blood.
4. Traumatic, which may be of external origin,

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* From the Department of Anesthesia, Providence Hospital.

as in wounds of the face with fracture into the antrum of Highmore or into orbital sinuses, or stab wounds of the neck or chest; or of internal origin, as in wounds or diseases of the gastrointestinal tract, or trauma of the lungs following straining.

Some of the etiological factors mentioned by Governale are:

1. Injury to the parietal or visceral pleura from fracture of ribs, or stab wounds of the chest.
2. Fracture of nasal or orbital bones or into the antrum of Highmore.
3. Perforated gastric or duodenal ulcers or esophageal malignant tumors.
4. The first or second stages of labor (spontaneous emphysema).
5. Injury to the lung during artificial pneumothorax or operation for empyema.
6. Administration of an anesthetic by direct insufflation.
7. Influenza (the mechanism is obscure).

Rosenheim, Governale, Parrish, and Rosenbaum each report a case following tonsillectomy. Forbes reports a case resulting from a foreign body lodging in a bronchus, prior to any bronchoscopy or operative procedure. Alexander and Follett note the occurrence of emphysema resulting from the inrush of air into stab wounds. Byrne reports a case following recovery from the anesthetic after a tendon transplant. This patient coughed a great deal after the operation, leading the author to believe that intrathoracic trauma led to the condition. Shastid reports a case of extensive emphysema following a penetrating wound of the apex of the left lung by a pencil. Woodward observed a case of emphysema of the head and neck following the perforation of an anterior tonsillar pillar by a pipe stem.

The conception of the mechanism of the internal pulmonary traumatic type is obscure. The most prevalent belief is that air from the lungs gets into the subcutaneous tissues by the intra- or extrapleural routes. If it does so by the intrapleural route, air passes through the visceral and parietal pleurae, and adhesions must exist between the pleurae at this point. If by the extrapleural route, air sacs on the periphery of the lung rupture and air follows the line of least resistance beneath the visceral pleura to the hilus of the lung, where, following the reflexion of the pleura onto the big vessels, it enters the mediastinum and then follows the fascial planes into the tissues of the neck, from which it spreads elsewhere.

According to the view of Governale the most common place for the pleura to rupture is at the hilus of the lung, the reason being that, as the lung expands to its entirety because of the increased intrapulmonic pressure, the thoracic wall gives protection to the periphery due to the resistance it meets there; but the pleura tangent to the mediastinum finds a minimum of resistance, and thus a rupture of a peripheral alveolus ensues.

During inspiration the lung expands and air rushes into the pleural cavity through the perforation. During expiration the lung collapses, the perforation closes, air cannot get back out and accumulates.

Air thus entering the pleural cavity produces first pneumothorax. Continued increase of the intrapulmonic pressure by means of coughing is followed by increase in the intrapleural pressure. By accumulation, air is communicated by force to the mediastinum and by following fascial planes or lines of least resistance works its way into the neck and beyond.

REPORT OF CASE

The patient, a robust, healthy, male child 5 years of age, was admitted to the hospital May 18, 1931, at 9:15 a.m. for circumcision and tonsillectomy. Urinalysis showed normal findings; coagulation time was $2\frac{3}{4}$ minutes. At 10 a.m. the patient received $\frac{1}{20}$ gr. of morphine sulphate and $\frac{1}{500}$ gr. of atropine sulphate. Anesthesia for the circumcision was begun by the regular nurse anesthetist at 11:20 a.m., induced with ethyl chloride, followed by ether. At this point the patient put up quite a struggle, fighting the anesthetic, straining, holding his breath, shrieking wildly and at times coughing reflexly. After several minutes he finally quieted down to the extent that the operation was begun about 11:30 a.m. Everything apparently went well until just before completing the circumcision (under light anesthesia). The anesthetist called the surgeon's attention to a swelling of the left side of the neck and left jaw. Believing the patient to be obstructed intraorally, aspiration was begun but without beneficial results.

At this point I was called from another room. I found the patient to be straining some, slightly cyanotic, and I noticed that as he strained the swelling seemed to ascend farther on the left side of the face and up under the left eye. On examination the left shoulder and left side of chest to about the 3rd rib anteriorly presented the familiar eggshell crackling feel. To percussion there seemed to be a tympanitic note of the right chest. An opinion was given of interstitial emphysema following pneumothorax. The patient was watched for several minutes; the gas could be pressed out of the tissues easily, but appeared almost instantly when the patient, now quite awake, coughed, cried, or strained while holding his breath, the emphysema spreading to the right chest, front and back. The operation for tonsillectomy was deferred. The anesthetic was stopped at 12 noon. The patient was taken immediately to the X-ray laboratory. The findings were as follows: May 18, 1931; immediately postoperative X-ray of the head and chest showed, "a partial right pneumothorax with mediastinal displacement toward the left and with a marked subcutaneous emphysema of the entire chest and neck. No rib injury visible." (Fig. 1.) An X-ray film of the head showed some air in the tissues of the neck. The pulse was 120, respiratory rate 36. Treatment was morphine and atropine and compresses. The next day, May 19, at 8 a.m. the temperature was 99.6°F., the pulse 119, respirations 28. The swelling was about the same, and the patient was comfortable. Morphine sulphate $\frac{1}{18}$ gr. and atropine sulphate $\frac{1}{300}$ gr. every four hours was continued; nourishment was given but was vomited. That night the swelling began to diminish. On the 20th, i.e., the 2nd day, there was continued improvement. The temperature was 99.6°F., the pulse 104, respirations 28, the patient taking a little nourishment which was retained, the swelling still less. On the 21st, the 3rd day, the patient felt quite well, and was discharged from the hospital. An X-ray plate showed "marked improvement in lung expansion," but there was a question of air in the pericardial sac. Air was still visible in the subcutaneous tissues. The temperature was 97°F., pulse 104, respirations 28. On June 2, 12 days after discharge from the hospital, an X-ray plate showed still more improvement, the right lung being nearly fully expanded, the heart in nearly normal position. Grossly no air was seen in the tissues, although some swelling was still present. On June 30, 42 days after the accident, the patient fell and broke his left clavicle. An X-ray plate showed fracture of the left clavicle and both lungs fully expanded and normal. On January 2, 1932 the patient reëntered the hospital for tonsillectomy. Precluding any possibility of a struggle, he was given a 60 per cent dose of avertin. During the operation some ether was necessary. The tonsils were removed by the dissection method, and an uneventful recovery ensued.

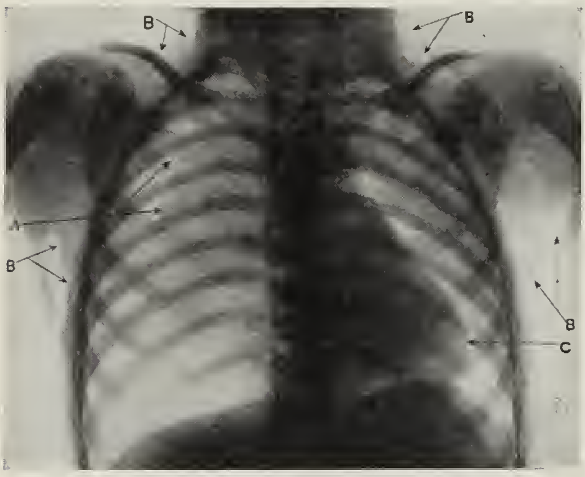

Fig. 1. Right Pneumothorax, Cardiac Displacement, Subcutaneous Emphysema

A, edges of collapsed lung; *B*, air in tissues of chest; *C*, displaced heart completely to left.

Conclusions

1. Subcutaneous interstitial emphysema is a rare condition.

2. One must rule out the bacillus of Welch as a cause of the emphysema and differentiate it from edema.

3. One must consider the possibility and seriousness of the condition if air gets into the circulation, causing emboli.

4. X-ray examination is of value in showing the nature and seriousness of the accident.

5. If there is bronchial obstruction, the anesthetic for operations upon the throat should be given with the head in a dependent position to prevent the plugging of bronchi by mucus, blood or pus.

6. Rapid, reflex-free induction best in such operations, although to abolish completely the pharyngeal reflexes is undesirable.

7. Benefit may be derived by the treatment of such conditions with morphine to allay cough and assure rest, and by keeping the patient quiet.

8. Surgical treatment by multiple puncture of the skin must occasionally be resorted to, and sometimes even tracheotomy, in case of severe pressure in the neck.

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Science Series. No. 5

SULPHUR AND CYSTINE IN VITAL ACTIVITIES

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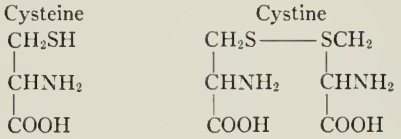
Throughout the ages sulphur has played a great part in the welfare and interests of man. In remote antiquity references to it can be found in one form or another. We find it in the philosophy of fire and brimstone. Among the alchemists sulphur played an important rôle in the transmutation of base metals to silver and gold. In agriculture and horticulture sulphur as such or as simple compounds has long been found useful in aiding growth of vegetation and in checking parasites. In medicine as shown by the various pharmacopeias and dispensatories sulphur and sulphur compounds have received much attention. Taken internally sulphur increases peristalsis and makes bowel movements softer and more frequent. At one time or another sulphur has been employed as a useful agent in constipation, hemorrhoids, pregnancy, lead poisoning, chronic rheumatism, gout, bronchitis and asthma. Externally in ointments, sulphur has been used in scabies, sciatica, psoriasis, eczema, acne, croup, etc. Sulphur baths have long been considered therapeutically valuable.

Though the rôle of elemental sulphur in inorganic combination is important for vital activities, the part played by organically bound sulphur, or better by organic compounds containing sulphur, is of the greatest importance in health and disease. At the present stage of our knowledge the known organic sulphur compounds in the human body or food are cystine, cysteine, glutathione, methionine and ergothionine. The study of sulphur in relation to vital activities has long revolved around cystine and its congeners, cysteine and glutathione. Of the rôle of methionine and of ergothionine little is known. The former is a sulphur-containing amino acid, isolated by Mueller, 1921–1923, from casein. For this compound Barger and Coyne in 1928 suggested the constitution, $CH_3SCH_2CH_2CHNH_2COOH$, and gave it its name.

Ergothionine is a sulphur-containing compound isolated from blood by Benedict (1925), by Benedict, Newton and Behre (1926), and by Hunter and Eagles (1925, 1927). It was found by Newton, Benedict and Dakin (1926) to be identical with the bases ergothionine isolated from ergot by Tanret (1909), and shown by Barger and Ewins (1911) to be the betaine of thiohistidine. Chemically, it is quite different from methionine and from cystine and cysteine.

As previously stated, studies on sulphur have centered about cystine. The discovery of cystine in a bladder stone was of vital interest and to this day cystine and its compound have remained of surpassing importance. Wollaston in 1810 found a urinary calculus containing predominantly a substance which he called cystic oxide which was later called cystine and found to contain sulphur. Since then the presence of cystine in the urine and even in certain tissues, as the kidney, and especially in the abnormal condition known as cystinuria, has been of interest to the clinician and the chemist, although the etiology of cystinuria has never been clearly understood.

In 1884, Baumann found that cystine could be reduced by tin and hydrochloric acid, that is, by nascent hydrogen to a new substance which he called cysteine. Baumann established that cystine was a reduced form, $C_3H_6NO_2SH$, and that cystine was the oxidized form or disulphide, $C_6H_{12}N_2O_4S_2$. In 1903, Friedmann definitely proved that the structural formulas of cysteine and cystine are:



Cysteine Cystine

$$\begin{array}{l} CH_2SH \\ | \\ CHNH_2 \\ | \\ COOH \end{array} \qquad \begin{array}{lcl} CH_2S & — & SCH_2 \\ | & & | \\ CHNH_2 & & CHNH_2 \\ | & & | \\ COOH & & COOH \end{array}$$

Tests for these compounds then began to be developed. The most useful was the nitroprusside reaction, despite its lack of specificity. Denigés (1889) had found the violet color produced by sodium nitroprusside [$Na_2Fe(NO)(CN)_5 + {}_2H_2O$] and alkali a very delicate test for the sulphydryl group (SH) of mercaptan, and Mörner (1902) applying it to cysteine claimed it would detect one part of cysteine in 50,000 parts of water. Gola (1903) applied the nitroprusside reaction to plants and found it widespread, especially in active tissue; and Buffa (1904), Heffter (1908) and Arnold (1910) established the fact that substances giving the nitroprusside reaction (a red color in the presence of sodium nitroprusside and alkali) occur in most tissues of the body. Heffter probably did more than any other of the earlier investigators to emphasize the importance of the nitroprusside reaction by his comments upon the possible significance of the sulphydryl group which the test is supposed to reveal. Then Hopkins (1921), (1929), employing the nitroprusside reaction step by step in his procedure, succeeded in extracting from yeast, mammalian muscle and mammalian liver, a complex of cysteine with glutamic acid and glycine to which he gave the name glutathione. By this isolation of glutathione Hopkins gave definiteness to the whole subject of the relation of the SH group to cellular oxidation-reduction and made a reality of what had long been a probability, namely, the presence of a definite, easily isolated SH compound in tissue.

The development of the knowledge of the relation of cystine and its congeners to vital activities is a long, interesting story, too detailed, however, to be given in a short résumé. Suffice it to say that it was shown by a number of investigators that the hair and the epidermal tissues of animals have a high cystine content and that cystine is one of the amino acids absolutely essential to proper maintenance and growth. To summarize the work of a great many investigators, it can be said that the sulphur containing amino acids, cystine and cysteine, as such or in complex with other groups, have been found to play a very important rôle in nutrition, in the inner metabolism of the body, in cellular respiration, oxidation and reduction and in biochemical defense. It was shown by Baumann and Preusse and by Jaffé that if more or less toxic material such as bromobenzol is fed to a dog the entire cysteine molecule is combined with the benzol compound to detoxify it and appears in the urine as a cysteine-brom benzol-complex known as mercapturic acid. As is well known, indol formed by intestinal bacteria from the amino acid tryptophane is oxidized, when absorbed, to indoxyl and tied with sulphur compounds and excreted in the urine as indican. Phenol as such or as formed from tyrosine is also to a high degree tied with sulphur and excreted. Potent physiological bases such as histamine lose their physiological activity when combined with sulphur, as recently shown by Pyman. Lang in 1894 found that intravenous injection of sodium sulphite, or better sodium thiosulphate, enabled guinea pigs to withstand double the lethal dose of hydrocyanic acid. Bodansky showed that the detoxication of potassium cyanide occurs more rapidly in the human organism when administration of the cyanide is preceded by the ingestion of cystine. Voegtlin and co-workers found that rats could be protected from a lethal dose of arsenoxide by a preceding or simultaneous injection of reduced glutathione. It is apparent that in the sulphur metabolism the animal body has a ready though limited means of defense. Evidence is at hand that the cystine complexes in the hair and skin protect the organism to some degree against ultra-violet light and actinic rays of the sun. Detoxification seems, indeed, a prominent rôle of the system cystine, cysteine and glutathione.

Little if any free cysteine or cystine can be found in the organs of the body, for example, the liver. The sulphur system exists here as glutathione, a tripeptide of cysteine, glutamic acid and glycine. This is regarded as playing an important rôle in intracellular breathing, oxidation and reduction. It is certain that there is a higher glutathione content in young and actively growing tissue. The sulphur in glutathione is very easily liberated and it is quite possible that one of the functions of this substance is to liberate active sulphur to aid in detoxifying injurious material. A further possible function of glutathione is that this complex represents a detoxification of cystine, which as will later be shown is toxic above certain levels. In feeding cystine on a high level Sullivan and Hess, in unpublished work, found the glutathione content of the liver of rats greatly increased over the normal.

Sullivan and co-workers (1919, 1920) made a chemical study of the diet, the saliva and urine in pellagra, and found indication that the sulphur metabolism was abnormal in this disease. In the acute stage the sulphocyanate content of the saliva and urine was found very low as compared with normal individuals or the same patient in convalescence. This finding suggested that the diet was lacking in proper sulphur balance, and led to a study of cystine and cysteine. From this study Sullivan (1926) developed a test of great specificity directly for cysteine and indirectly (after reduction) for cystine. This test depends on the fact that cysteine alone of a long list of compounds gives a beautiful red color with beta naphthoquinone-monosulphonate in an alkaline reducing atmosphere. It is so specific that it differentiates cysteine from glutathione and even from iso-cysteine. Numerous tests have been devised for cysteine and cystine but in toto these tests are tests for the sulphur grouping and their validity is dependent upon the reducing capacity of the (SH) group in cysteine or the sulphur split-off from cystine. They may be satisfactory in definite circumstances, but as they are relatively non-specific, they always leave a question in new fields and in many instances are erroneous in old fields. The Sullivan test requires for a positive outcome, that the three groups of cysteine be free and in the order as occurring in natural cysteine, given below, since iso-cysteine is negative in this test.

Cysteine	Iso-Cysteine
CH_2SH	CH_2NH_2
$CHNH_2$	$CHSH$
$COOH$	$COOH$

The Sullivan reaction is primarily a cysteine test but can be used for the estimation of substances which yield cysteine by reduction, by hydrolysis, or by a combination of these processes, for example, cystine and glutathione or other cystine complexes. Using this test as a tool, qualitatively and quantitatively, investigations have been made of the cystine content of a long list of food stuffs, of the peptones used in bacteriological culture media, of the active principles of the glands of internal secretion, especially the pancreas and pituitaries, and the rôle of absorption of cystine. In association with other tests, it is now being applied at the Chemo-Medical Research Institute, Georgetown University, to the relation of sulphur metabolism to health and disease, the questions of experimental cystinuria and cataract, the nature of the sulphur compounds in the crystalline lens, the differentiation of the sulphur compounds normally found in urine and their variation in health and disease, and the cystine content of the finger nails in arthritis.

A brief outline of some of the results to date can be given. The cystine content of purified protein varies greatly. Those that have a percentage content as low as 0.3, such as casein, tend to be deficient in cystine as judged by feeding experiments with the white rat and on a low level of protein intake have to be reinforced with cystine before satisfactory growth is obtained. An interesting protein studied is phaseolin, a beta globulin, the principal protein of the navy bean. Work by a number of investigators using accepted tests for cystine, the Van Slyke test and the Folin-Looney test, indicated that this protein was plentifully endowed with cystine. Nevertheless, used as a sole protein in feeding experiments, with the rest of the diet suitable, no growth was obtained until cystine was added. The conflict between the results of chemical analysis and feeding experiments seemed to us to have, a priori, a possible explanation in the need of added cystine to overcome the injurious effect of a toxalbumin or some produce resulting from the metabolism of phaseolin, or to offset some action of phasins found by Wienhaus (1909) to be present in this bean and to have the property of agglutinating suspensions of red blood corpuscles. Actually, however, the phaseolin was found to have little if any cystine when the hydrolysate was tested by the Sullivan method. Peptones used in bacteriological culture media were likewise found to vary widely. Witte's peptones for example were found rich in cystine, while Difco's contained only a small amount. What this difference means in growth relationship, toxin production, etc., is yet to be ascertained. Insulin, the pancreatic hormone regulating sugar metabolism, was found by Du Vigneaud (1927) to contain a large amount of cystine, and Sullivan and Smith (1928) found that the active principles of the posterior pituitary contain highly reactive sulphur. In the case of the cataractous lens it has long been known that such lens have lost more or less the capacity to give the nitroprusside reaction. Now, Sullivan, Hess and Evans are making a detailed study of normal and cataractous human lenses. As regards experimental cystinuria the same investigators have considerable evidence that toxic substances such as naphthalin given by mouth to rabbits and dogs are oxidized and tied with cysteine in the same way that long ago Baumann found brombenzol to be tied. The cystine or cysteine found in the animal urine in a bound form after naphthalin is an appreciable amount.

Long acquaintance with cystine and sulphur studies makes it evident that in various pathological conditions there is a question of the part played by cystine and cystine complexes directly or indirectly. Moll (1904, 1905) gathered some data that showed the albumin-globulin ratio in the blood to be changed in intoxication. Normally the albumin is present in the greater amount. In infection this ratio may be changed so that the globulin is in the ascendency. If this finding holds it is very interesting, since Folin and Marenzi found a very high cystine content in serum albumin, a finding verified by Sullivan and Hess (1930), using the Sullivan method. Acting on the hypothesis that a strain on the organism by an intoxication calls for sulphur, Sullivan and Hess made a study of the cystine content of the finger nails in arthritis. They found that in this abnormal condition the cystine content of the finger nails is in many cases considerably below normal. The study is being continued. Whatever may be the explanation it is true that sulphur and sulphur compounds are regarded with favor clinically in the treatment of arthritis.

We have laid stress upon sulphur and cystine complexes as beneficient ingredients in the diet. This is not always so. Too much of a good thing may be injurious. Thus injury to animals from small amounts of free cystine in the diet has been reported by other investigators. Lewis (1925) administered cystine orally as the sodium salt in doses of 1.0 to 4.0 grams for 3 to 4 consecutive days to 2 fasting rabbits and to 2 rabbits on a diet of oats and cabbage. All the animals died. Histologically, Warthin found acute passive congestion of the kidney, cloudy swelling of the convoluted tubules and casts in the collecting tubules. Curtis, Newburg and Thomas (1927) in feeding experiments with rats found that the addition of as little as 0.5 per cent of cystine to their basal diet containing 18 per cent casein produced evidence of renal injury after the diet had been ingested continuously for 4 or 5 months. Later Cox, Smythe and Fishback (1929) found that 0.3 to 0.9 per cent of free cystine in the diet is nephrotoxic to young rats weighing 60 grams or less but not to rats of 80 to 90 grams.

On the other hand, Addis, MacKay and MacKay (1926–27), in long continued feeding experiments (330–360 days), found no kidney injury when 1 per cent of free cystine was fed in the diet to rats which at the beginning of the experiment were 30 days old and weighed 60 grams. Sullivan, Hess and Sebrell (1932) in agreement with Curtis and Newburg (1927) found that 10 per cent free cystine in the diet acted like a powerful poison to rats with marked injury to kidney and liver. When 5 per cent free cystine was added to the basal diet, Sullivan, Hess and Sebrell got excellent growth, much better than reported by other investigators, and they drew the conclusion that the high amount of dried yeast in their basal diet and in that of Addis, MacKay and MacKay, as compared with the small amount of yeast vitamin extract in the diet of others, protected against cystine. An interesting finding of Sullivan, Hess and Sebrell was that 5 per cent free tyrosine in the diet was overwhelmingly toxic but that this toxicity could be markedly offset by adding 5 per cent cystine; they drew the conclusion that there was an optimum amino acid balance in foodstuffs. As regards the effect of large amounts of cystine in the diet on the liver and kidney it should be said that normally there is rarely 1 per cent cystine in the diet and this is combined with balancing components.

Résumé

Sulphur compounds occur in our foods and in the body. The hair contains about 15 per cent cystine, the nails normally about 12 per cent, in both cases in a bound form liberated in vitro only by long boiling with acid. Internally, cystine is present as a complex, glutathione, but in relatively small amounts. It occurs in the liver to the extent of 0.2–0.3 per cent of the net weight of the liver. Cystine complexes must be in the diet to get normal growth. Ingested cystine forms cysteine, makes taurine of the tauro-cholic acid of the bile, aids in the synthesis of glutathione, and takes part in the formation of keratins in the protective layers, the hair, nails, and to a lesser degree the skin. As such, or from glutathione, cysteine and cystine liberate sulphur for detoxication, for sulphonation of injurious material in indol, phenols, etc., and for tying up brombenzol, naphthalin, etc.

Glutathione plays a rôle also in oxidation and reduction and in intracellular breathing. It is the form in which cysteine and cystine occur in the organs of the body. Since it is a labile compound with a very loosely bound sulphur, it is probably the form utilized mostly for detoxication purposes.

The study of the various sulphur compounds offers a fruitful field for research in various pathological conditions.

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ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Surgery as an Aid in the Management of Pulmonary Tuberculosis,"* by **John Alexander, M.D.,** Professor of Surgery, University of Michigan, Ann Arbor.

An account was given of the system of consultation between the medical staff and consulting thoracic surgeon that is practiced today in practically every important sanatorium in the State of Michigan. The staff of the sanatorium and the consulting surgeon meet at stated intervals in a room with roentgen-ray view boxes where the entire series of films of a given patient may be reviewed and where a member of the staff can present the patient's history and physical and laboratory findings in abstract. The patient himself is then presented, and, if desirable, examined. After the patient has left the room the medical staff and the thoracic surgical consultant discuss whether or not any surgical procedure should be performed and if so, which of the many operations offers the best chance of cure and the least risk. Only operations on the phrenic nerve are performed at sanatoria that are not easily available to the surgeon for visits during the postoperative days; other operations are performed at the hospital of the thoracic surgeon so that he may be in close contact with the patient during the postoperative convalescence.

In several of the larger sanatoria in Michigan, from 50 to 70 per cent of all adult patients receive either artificial pneumothorax or some surgical operation or both. This system of management is resulting in a practical reversal of the mortality-cure figures not obtained under the old unaided sanatorium regime.

Performance of the various operations and especially selection of the proper operation or combination of operations requires exacting training and broad experience if success and not disappointment is to follow.

The speaker illustrated with slides the various procedures used and showed roentgenograms and photographs to demonstrate the effect of the various operative measures upon various types and phases of pulmonary tuberculosis. The procedures discussed were as follows: artificial pneumothorax; closed (Jacobaeus) and open interpleural pneumolysis; radical temporary and permanent phrenic nerve interruptions; scaleniectomy; temporary and permanent multiple intercostal neurectomy; extrapleural pneumolysis with filling of paraffin, pectoral muscles or rubber bag; paravertebral, anterolateral and parasternal extrapleural thoracoplasty. He then discussed methods of treating tuberculous empyema.

DISCUSSION

Dr. W. D. Tewksbury: This has been the most complete and comprehensive presentation I have ever heard on the subject of chest surgery. I have been doing pneumothorax operations since 1913, almost 20 years, and have had 500 or 600 cases in that time. I have seen many cases such as Doctor Alexander described that could have been saved. We are very, very fortunate to have him with us tonight to give this complete talk. This work has been done for many years. He has combined work of men all over the world, work of 4 or 5 separate specializing surgeons. I think it is a wonderful thing. We have men here in Washington who have done this work. Doctor Archibald in Canada was one of the pioneers. He did one case for me in about 1920, twelve years ago. The patient is still living and well. I was fortunate in 1927 to go through the hospital with Doctor Archibald to see cases he had at that time. What we have been doing for years in our sanatorium work is first to put the patient to bed for a month. After a period of 4 to 6 months if he shows no improvement we try pneumothorax. After another period of 4 to 12 months if pneumothorax is not successful we consider phrenectomy. If this does not produce an arrestment in from 6 to 12 months we then consider the more radical thoracoplasty. This usually means that several years elapse before the patient reaches this operation. I believe we are going to save many patients who have previously become hopeless if we operate earlier. Our Hospital 25 years ago was filled with patients who lived for several years and finally died because nothing had been done.

Dr. Charles S. White: I feel we have been very fortunate to hear Doctor Alexander on this subject. He has done more than any other man in this country in this particular work. I am not qualified to discuss the talk technically. I had occasion to visit Doctor Alexander's clinic and I was surprised to learn of the attitude of patients toward these operations. They could hardly wait. One patient who had pernicious anemia was operated upon and in an hour or so later was smoking a cigar. The patients are in a happy frame of mind a short while afterward. We must look to these large clinics as a sign-post by which we may be guided. Doctor Alexander may wake us up a bit. The family physician should recognize the condition earlier and more often. I appreciate the opportunity of being able to listen to Doctor Alexander.

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* Presented March 16, 1932.

Colonel W. L. Keller, Walter Reed Hospital: It was indeed a great pleasure to hear an authority like Doctor Alexander discuss this interesting subject, and I feel that there is nothing I can add. I would like, however, to say something concerning the practice of promiscuous operating or thoracotomy on empyema cases before the etiological factor has been determined. As you know, an open thoracotomy in tuberculous empyema always means mixed infection and much radical surgery that such patients are physically unfit to endure. I have had 124 of these cases, from which I have learned some sad lessons and especially the fact that in those who have had open thoracotomy with mixed infection the longevity on a 5 year follow-up is markedly reduced when compared with a series that have not had open thoracotomy. I had made arrangements to show Doctor Alexander slides and some patients, representing 24 of these cases that have had a 5 year follow-up, but the meeting could not be arranged this morning owing to other engagements. The greatest tragedy that can befall a patient with tuberculous empyema with sterile fluid in the thoracic cavity is for somebody to do an open thoracotomy. Such a mistake should be prevented by a carefully taken history, thorough physical examination and proper analysis of the data obtained. As to the selection of cases of unilateral pulmonary tuberculosis for thoracoplasty, I feel that it should be based on the combined findings of the internist, the radiologist, the bronchoscopist and the surgeon. This was recently impressed upon me by a visit from a physician friend of another city I had known overseas. He asked me to examine the films of 4 cases that had not responded to thoracoplasty; 1 of these patients probably was a fair operative risk and did improve, 2 of them should never have been operated upon because the disease was so far advanced in both lungs, and the fourth one should have had, if anything, a pneumothorax. As to further discussion of Doctor Alexander's paper, his work has always been an inspiration and great aid to me; and personally I regret that I am not an extemporaneous speaker nor able to talk as fluently as Doctor White, but nevertheless I trust that you will believe me when I say that any inadequacy of speech or poverty of words on my part does not mean lack of appreciation for this pioneer work done by Doctor Alexander which I feel is second to none in this country or any other country.

"Present Status of Sinus Surgery,"* by **G. B. Trible, M.D.**

With an idea of arriving at the relative proportion of operative cases of sinus disease applying for treatment in the various offices, the methods of procedure followed and the results obtained, a questionnaire consisting of 14 questions was prepared and mailed to about 150 oto-rhino-laryngologists. On the basis of the answers received these data are worth mention:

About 45 per cent state that in their opinions the operative cases are 10 per cent or under; another 10 per cent think they are between 10 and 25 per cent. The greatest need for surgical intervention in the practice of 93 per cent is found to be in maxillary sinusitis, and in the remaining 7 per cent in ethmoiditis. The diagnostic selective criteria are given as chronicity, empyema, symptomatology, pain, complications of eye and brain, allergy or focal infection, puncture, transillumination, X-ray, etc. It was found that 61 per cent prefer intranasal surgery and 39 per cent extranasal; 81 per cent prefer local anesthetic, 8 per cent general and 11 per cent combined. The antrum punctures by the classical route beneath the inferior turbinate are recommended by 87 per cent and 13 per cent prefer the natural ostia. It was found that 59 per cent use lipiodol or other roentgenopaque solutions, and 35 per cent do not. X-ray is found of great value by 98 per cent, while 2 per cent seldom use it.

Summing up the consensus of opinion it may be said that unfavorable results in sinus surgery come from (1) too radical procedure, (2) too conservative procedure and (3) inexperienced operators. The non-use of surgery in cases delayed too long or given bad judgment produced such unfavorable results as asthma, chronicity, eye complications and brain complications. Diet and ultraviolet therapy are considered valuable adjuncts and in answer to the 14th question, "State briefly a résumé of your opinion of the present state of sinus surgery?," 8 report it has a useful place, 26 are becoming more conservative, 7 think there are too many untrained men, 14 believe there is too much and too radical surgery, 7 consider results disappointing and unsatisfactory, 29 think surgery is now good, and 6 believe treatment is too conservative.

The outstanding facts gleaned from this questionnaire are:

1. The great preponderance of opinion is that the maxillary sinus is the one most in need of surgical attention. The prevailing opinion is that in puncture or aspiration of these sinuses the classical route beneath the inferior turbinate is preferable.

2. The increasing importance of intranasal surgery is stressed.

3. The increasing importance of the use of local anesthesia and of combined local and general anesthesia, except in cases of children, is apparent.

4. The importance of diet, particularly in the allergic cases and in children, is generally established.

5. The attention paid to light therapy and climate is important.

6. The feeling has seemed to be that even with our disappointing results in a great many cases, surgery still is indicated and has enough successes to justify its continuance.

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* Presented February 17, 1932.

DISCUSSION

Dr. G. Bache Gill: I feel that this Society is greatly indebted to Doctor Trible for bringing forward his painstaking paper on the "Present Status of Sinus Surgery." This type of presentation required a great deal of work, trouble and unselfishness. To discuss this paper as it was presented would require a great deal of time and I will try to bring out a few points which are most interesting to me.

First: The question of operative versus non-operative treatment in the diseases of the nasal accessory sinuses. It is certainly a fact that there is a good deal less operating at the present time than was done formerly. With our present knowledge of the effect of proper diet, regular exercises and different forms of light therapy, I think that we can accomplish a great deal more by treatment than we could have done a few years ago. We are beginning to see that our operative cases are coming back to us almost as frequently as those that were not operated on. I believe that we have learned that the simpler the surgery in most cases of nasal sinus diseases the better. I also think the day of radical extranasal frontal, the extranasal antrum and the total evisceration of the ethmoidal sinuses is a thing of the past with the exception of a few rare cases. At the present time I have over 200 cases that have been operated on for frontal sinus infections which consisted of the removal of the anterior tip of the middle turbinate, anterior ethmoidal cell and enlarging of the opening in the frontal sinuses (which is comparatively a minor operation as compared to the external). These cases have been perfectly satisfactory over a period of several years.

Second: The question as to what sinus requires surgical intervention most often. Regarding the large number of times in which the antrum is operated upon as compared to the other nasal accessory sinuses, I believe this is due to the fact that we have learned that a good deal of our ethmoidal infections are due either to frontal sinus infections descending or antrum infections ascending. It is practically impossible to have an antrum or frontal infection without an involvement of the ethmoid. I think that this has been a very valuable discovery because, as we all know, the making of a window in an antrum is a comparatively small thing as compared to evisceration of the ethmoidal sinuses.

Third: The question as to an opinion of the present state of sinus surgery. Regarding the fact that 29 answered that surgery is now good, I think probably that could have been better answered by stating that we are now learning when to operate and what to do as well as what not to do.

In conclusion, I would like to say that I believe that the present surgery of the nasal accessory sinuses regarding ultimate results can be very favorably compared to any other branch of surgery. When Mosher said: "There are enough unsolved problems in oto-laryngology to satisfy the ambitions of any one" he conveys a great deal of food for thought. I think that this saying is also applicable to any branch of medicine in which one is engaged. I would also like to say that I feel quite optimistic about the results I am getting from non-surgical as well as surgical treatment compared with that of former years.

Dr. Oscar Wilkinson: I am sure we were all pleased to hear Doctor Trible's very thorough résumé. We should be very conservative before we undertake operative procedure. Our new method of treatment has eliminated a great deal of surgery that we formerly did. People are taking better care of their sinuses and better care of their health than before. When we attack a very definite disease in a definite sinus, the object to be attained is thorough ventilation and drainage of that sinus. If that is done we are going to get good results. It is here that we should not be conservative. I think that men are doing better surgery than they ever did before. I am certain men are better prepared than they have ever been to do sinus surgery. I should like to correct a false impression which is prevalent among the laity and a great many physicians, that when you once operate on the nasal sinus you have to re-operate. That has not been my experience, nor the experience of men who do thorough work when they do the surgery. One can readily see that one infected sinus will infect another if neglected. Sinus surgery will never pass away. When a sinus becomes thoroughly infected we should operate.

Dr. R. A. Kearny: The subject is a timely one. It would have been timely 10 years ago, and 20 years from now will also be interesting. Doctor Trible's paper has been an illuminating one. We all have our viewpoints on this subject. The important thing is to make a thorough diagnosis first and follow that up with good surgical judgment. The man that has been well trained in sinus surgery will go a long way toward solving the problem. Correct diagnosis and surgical judgment are the important factors for consideration. If you make mistakes thresh them out. I would like to say a lot about this paper but time will not permit. I was in Boston the last of October attending an alumni meeting. A patient had had a Caldwell-Luc operation performed 8 months before. He was taken to the Massachusetts General Hospital with cerebrospinal menigitis, and died the day of my arrival. Autopsy was done. One most illuminating thing was that normal mucous membrane had replaced the old diseased membrane removed from the antrum 8 months previously. The specimen of mucous membrane was sectioned, and the active cilia on normal mucous membrane was beautifully demonstrated under the microscope and a moving picture taken. Doctor Trible should be congratulated on his success in receiving answers to 120 of 150 questionnaires.

Dr. James A. Flynn: From Dr. Trible's report one would infer that sinus disease is purely a surgical disease. That is far from the truth. Sinus disease occurs in every head cold. Why does this occur? Generally from deformity in the nasal structure. I believe 97 per cent of human beings have deformed noses. We must secure thorough ventilation for the healthy functioning of the sinus, and that can only take place when the nose is properly proportioned. As Doctor Trible states the most common sinus trouble is in the antra. Operation in this sinus is practically limited to one operation: the Caldwell-Luc operation. In doing this operation the entire lining should be thoroughly removed down to the bone and the entire middle part of the lateral wall should be resected to insure permanent drainage. The frontal sinus is rarely affected provided one takes care of the anterior ethmoid cells. I have done only 3 external sinus operations in the past two years. The frontal sinuses are extensions of the anterior ethmoid group of cells into the frontal bone, and these cells empty by their own ostia. These ostia open into the middle meatus in a backward direction. Therefore we can open the frontals when we open the anterior ethmoids and for that reason operation on the frontals is rarely necessary. One thing more: The use of cautery has been suggested by the author. Cautery has no place in sinus treatment. It has been suggested as a treatment for malignancy, but with this statement I emphatically differ. The only treatment for malignancy is early diagnosis and thorough eradication by surgical means. Any other form of treatment is short of the mark and one is courting disaster in the form of meningeal complications.

"Marie-Struempell Disease with Unusual Result from Treatment,"* by **Guy W. Leadbetter, M.D.**

Case Report: A white male patient, aged 41 years, was first seen on September 16, 1928, complaining of pain and swelling of the left knee. He gave a history of a specific violent injury six years ago causing a fracture of the left femur, just above the knee joint. Clinical examination revealed loose bodies within the knee joint. Subsequent x-ray following injection of air did not corroborate this diagnosis. In February 1928 there was a history of recurring hydrops of both knees with a definite cycle of swelling. One knee reached a maximum and subsided before the opposite knee began the cycle. General physical examination did not reveal positive findings except those of the knees, some pain in the back which migrated from place to place at various times, and a moderate secondary anemia. Several successive aspirations of the fluid from the knee joint revealed an esssentially normal cell count. The culture showed a diphtheroid organism which was of no real value in determining the etiology. The patient was lost sight of until July 1931. During the interval he had had cycles of improvement and recurrence of old symptoms. He stated that he had taken several courses at Arkansas Hot Springs with some temporary relief. Examination revealed flexion deformity of spine, hips and knees. There was complete fixation of the ribs at this time and respiratory movements of the chest were entirely restricted. There was a marked grade of secondary anemia. X-rays revealed a definite fusion of the right intervertebral ligaments together with definite changes in the left hip joint. This is a case of true spondylitis deformans of the Marie-Strumpell type. The patient was hospitalized and treated by suspension traction and exercise of the muscle of the leg and back in order to reduce the hip deformities. It was necessary to do a posterior capsuloplasty of each knee and an anterior capsuloplasty of each hip. The patient had an uneventful convalescence from each operation. He left the hospital 5 months following admission with his perpendicular height being increased from 4 feet 2 inches to 5 feet 6 inches. The spine had been straightened fully 75 per cent. The hips had about 10 degrees flexion and the knees were essentially straight. Examination on February 2, 1932, revealed gaining of strength and increased activity. He uses a cane about the house and crutches when going out. There is very little pain in the joints and no tendency to a return of the acute symptoms.

This represents a case of Marie-Struempell arthritis, the etiology of which is not known. It is probably infectious but some endocrine imbalance may be a factor also. No medication administered intravenously, intramuscularly or orally has been successful. Treatment should be directed along lines of prevention of the deformity and hastening of complete ankylosis which is most certain to occur. Spinal fusion has been done in two cases with varying success. The Marie-Struempell type usually involves the intervertebral ligaments as well as the hip joints, but may progress and involve the shoulder joints. The Von Bechterew type occasionally appears with calcification of the meninges, extreme root pain. This case presents the difficulty of diagnosis because of its unusual onset.

DISCUSSION

Dr. Thomas M. Foley: This is one of the oldest diseases known to man. We find that young race horses that have been raced hard before full development have this characteristic appearance of the spine. There was a very distinguished surgeon here about 6 years ago, who acquired this disease. Everything that could be done and thought of was tried in this case, but he died. I believe that a great deal can be done if the disease is recognized early and proper treatment given. The lumbar curve flattens out and the dorsal curve is angulated. The atlo-axoid joint is seldom involved, so that you have a man that is stooped and always looking at the ground. The costo-vertebral joints are often fused and impair respiration, and also the nerve root foramina have deposits of bone which cause pressure on the nerve roots at their exit, especially the 4th and 5th lumbar. This accounts for the pain across the buttocks and down the legs. Something could be done before they get to the operative stage by mild manipulation and corrective braces. I wish to call attention to a point—never to touch a "hot" joint when the joint is swollen. The best time is after a period of rest when the joint is "cold." There are cases that go on to complain of anesthesia and sometimes paralysis from deposits in the spinal canal. Adson of Rochester has done laminectomies on 6 cases. In those cases we can aid nature by fusing the spine. Most of these people have pain in the shoulders. The hip is nearly always involved. Vaccine treatment should be tried. The vaccine is made from cultures from the gums, teeth, throat and feces, and some streptococci from established foci added plus blood that has been complementally fixated with established foci. The disease is a systemic disease and it follows that systemic treatment should be used in all cases.

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PHYSIOTHERAPY IN THE DISTRICT OF COLUMBIA

Do you as a member of the Medical Society of the District of Columbia know that you have in the District an organization whose purpose it is to coöperate with the medical profession? This organization was born about 1920, the result of efforts of the hundreds of physiotherapy aides in the employ of the Medical Department, United States Army, during the World War. When Doctor Goldthwaite and other representative physicians returned from an inspection tour of hospitals in England, France and Belgium, it was decided by the Surgeon General of the Army that the results of physiotherapy treatments in these hospitals warranted the introduction of this department into our Army hospitalization program.

Having decided to inaugurate this method of treatment, the problem arose of supplying the personnel to carry on this work. The nurse was neither prepared nor had the time to take on additional duties. A call went out to physical education schools throughout the country for young women who were graduates of such schools. Intensive post-graduate courses were given in various medical schools and thus the position of Physiotherapy Aide was created. While the various modalities employed in physiotherapy have existed since a civilization began, physiotherapy as a definite part of the hospitalization program was born during the World War.

With the increase of these activities in the Army and Navy hospitals, civilian hospitals also adopted physiotherapeutic measures, and this interest has grown so rapidly that at the present time most hospitals boast of well equipped physiotherapy departments.

With this increased interest on the part of the medical profession came also interest on the part of the many cultists, faddists and the like, who soon learned that their unethical practice was highly remunerative. Unfortunately there are still those among the supposedly educated in our country who put the greatest faith in the chiropractor and like practitioners. These faddists were not alone in reaping the benefits of their enthusiasm. The various manufacturers of electrical equipment all over the country have enjoyed bounteous financial returns as a result of their unwarranted statements regarding the merits of their products. Since many of these machines were used for psychological effect only, the faddists soon worked hand in hand with the manufacturer.

One of the problems facing the medical profession today is to stamp out the unethical practice of physiotherapeutic measures, to eradicate the many cults springing up like mushrooms and to curb the activities of hyper-enthusiastic salesmen of electrical equipment. To help in this endeavor the American Physiotherapy Association has been organized. This organization defines physiotherapy as the treatment of disease or traumatic conditions by means of non-medicinal measures comprising massage, exercise and the physical, chemical and other properties of heat, light, water and electricity (except X-ray and radium), and it definitely states that *this treatment shall be given only under the direction of a licensed physician.* The purpose of this association is to establish and maintain professional and scientific standards for the practice of physiotherapy and to promote the professional welfare of those engaged in this practice by coöperating with the medical profession.

The American Physiotherapy Association is a national organization with chapters in the leading cities. The Washington chapter is comprised of 25 enthusiastic members, all of whom have responsible positions with physicians or in hospitals. Monthly meetings are held at which leading physicians in the city have generously given interesting talks on subjects relative to physiotherapy. The terminology employed in physiotherapy has already been standardized by the Council on Physiotherapy of the American Medical Association and much is being done to standardize the training of physiotherapists. Little has been done to eradicate unethical practice. To accomplish this difficult task the American Physiotherapy Association earnestly seeks the interest and wholehearted coöperation and support of the medical profession.

Washington offers some interesting activities in the field of physiotherapy. There are in the City, two training courses in physiotherapy (both approved by the American Physiotherapy Association), one conducted by the United States Army at Walter Reed General Hospital, now in its tenth year, and a new project at the Washington School of Physical Education at 1726 New Hampshire Avenue, N. W.

The District of Columbia Chapter of the American Physiotherapy Association counts among its members the following: Miss Louisa Lippitt, in charge of physiotherapy at Children's and Emergency Hospitals and the training course in physiotherapy at 1726 New Hampshire Avenue, N. W.; Mrs. Freda Gassin, Supervisor of Physiotherapy at the United States Veteran's Hospital, Mt. Alto; Miss Helen Moore, physiotherapist at the Crippled Children's School, 23d and M Streets; Miss Laura Sansbury and Miss Mary Lee Castleman, with offices at 1801 Eye Street, N. W., physiotherapists associated with Doctors Hall, Leadbetter, Borden and others; and Miss Emma E. Vogel, Supervisor of Physiotherapy and Assistant Director of Training Course in Physiotherapy at Walter Reed General Hospital.

E. E. V.

EDUCATION FACILITIES FOR PHYSIOTHERAPY IN WASHINGTON

A school of physiotherapy, the first in this part of the country in which credit is given for a nurse training, was started this fall in connection with the Washington School of Physical Education at 1726 New Hampshire Avenue.

This course is open to graduates of recognized schools of Nursing, Physical Education, and to students of the Washington School of Physical Education. The curriculum is that required by the American Physiotherapy Association, so that graduates from the course will be eligible to take positions in any state.

The Washington School of Physical Education is under the direction of Miss Pearl Hicks, M.A. Miss Hicks was formerly head of the Department of Physical Education at State's Teacher's College, Fredericksburg, Virginia, where she organized and introduced the four year course in physical education; she has had also several years of experience in teaching and coaching. She is a graduate of the Thomas Normal School, attended the University of Wisconsin, and received her Master's degree from George Washington University.

The physiotherapy course is directed by Miss Louisa C. Lippitt, R.N. and Physiotherapist. Miss Lippitt is a registered nurse, a member of the Graduate Nurse Association, and was one of the group of nurses who helped to organize and finance the Registry for Nurses in the District of Columbia. She is also a member of the American Physiotherapy Association and of the local chapter. She was for several years Director of Corrective Gymnastics for Girls, at the University of Wisconsin, where she instructed physical education students in therapeutic gymnastics, personal hygiene and massage, and gave corrective gymnastics to the freshmen girls in the University.

Both theory and practice courses for physiotherapy students are given at the Washington School of Physical Education and at the Children's Hospital, and experience in working with adults may be obtained at Emergency Hospital, where Miss Lippitt also has charge of the physiotherapy clinic. The course is a 9 month's course, and students can live at the school or attend as day students; but the course is so arranged that it can be completed in 9 months or be extended, to make it possible for those doing part time work to complete it in 2 years. Classes will be given in the late afternoon and evening by Miss Hicks and her staff, and by Miss Lippitt for nurses or other students employed during the day. Practice clinics at the hospitals are held, at Children's Hospital in the morning and at Emergency Hospital in the late afternoon.

L. L.

SCHOOLS FOR CRIPPLED CHILDREN IN WASHINGTON

In November, 1929, two public schools for crippled children were opened in the District of Columbia; Weightman School for white children at 23d and M Streets, N. W., and Magruder School for colored children at 17th and M Streets, N. W.

Before the opening of special schools many of these unfortunate children were obliged either to go without any schooling whatever or to attend the regular schools in the City. This was a disadvantage owing to the fact that in order to receive the prescribed physiotherapy treatment it was necessary in many cases for them to lose 1 or 2 days a week to attend the out-patient clinic at Children's Hospital. In addition it was impossible for them to receive the individual care and attention so often required by children physically, and sometimes mentally, handicapped. Also, it is obvious that children wearing braces cannot sit comfortably all day at the regular classroom desk provided for in public schools.

These children are collected from all sections of the city by busses rented by the District of Columbia from a local traction company. At the opening of Weightman School approximately 40 children were admitted, this number now having increased to fifty. The equipment authorized by Congress has been completely installed and except for more needed floor space the building is well provided to care for those now in attendance.

The dietary demands of each child are given special attention by a dietitian and a cook. At 10 o'clock in the morning the children are given milk, and at noon a well balanced meal is served. A matron is always on duty to care for the many individual wants which may arise.

The physiotherapy department at Weightman School consists of 1 large room divided into 2 areas as follows: The hydrotherapy section, equipped with:

Hubbard hydrotherapy tub,
Arm whirlpool,
Leg whirlpool,
Shower,
Dressing room;

and the treatment room, equipped with:

Walking frame with mirror,
Foot inversion tread,
Rowing machine,
Stall bars,
Triple posture mirrors,
Double pulley weights,
Infra-red baker, 1 large and 1 small,
Quartz mercury vapor lamp,
Two treatment plinths,
Cots for resting,
Dumb-bells,
Indian clubs,
Wands.

One physiotherapist works full time, treating the children who are sent from their class rooms according to a definite program. Each child is treated twice a week and special exercises are given daily in some cases.

No child is treated without written permission from the parent or guardian and a prescription signed by the physician in charge of the case. The school medical inspector visits frequently, and all activities are closely supervised by him.

In addition to this, parents are urged to receive instruction from the physiotherapist regarding supplementary treatment at home. Forms are provided by the school which the children are required to keep showing the amount of exercise done at home, the work being verified by the signature of the parent or guardian.

The greatest difficulty has been overcome by the Parent Teacher's Association which has without fail provided transportation to the numerous clinics where it has been necessary to send children whose parents have been unable to take them. This is done, of course, only with the parents' full consent.

A playground was planned with the usual apparatus provided for normal children, namely; slide, swings, jungle gym, flying rings, seesaws, and baseball, football and basket ball appurtenances. Naturally the aim of the school is to allow as nearly normal activity as possible, and the use of this playground produces not many more bumps or skinned knees than is usual with the younger generation.

There is a special class for atypical children besides the 8 academic grades where excellent occupational therapy is carried on by the teachers.

It is generally felt that the school has passed the experimental stage and has now become a permanent institution. At a meeting of a committee representing the Board of Education, the Health Department and the Kiwanis Club, it was decided that the project was quite worthwhile, and plans are now under way to ask Congress for another appropriation to build a larger and even better equipped institution. There is some question as to whether it is more advantageous to continue on the present regime or to build the new school in connection with Children's Hospital and transfer all medical care of the children to the Hospital.

There can be little doubt in anyone's mind that it is economically necessary to educate these children, and to one who is thrown in daily contact with them it seems ethically a glorious idea. It is enough to say that most of the children dread vacation, which should make the next step the establishment of a summer school for them. Visitors are cordially welcomed and are asked to suggest investigation of the school to those for whom it might help solve a difficult problem.

H. M.

THE GEORGE WASHINGTON UNIVERSITY SCHOOL OF MEDICINE FOR 1932–33

Reorganization of Teaching Staff, New Buildings and Equipment, Additions to the Faculty

The Administration of the School of Medicine of the George Washington University has announced the development of the institution on a University basis and beginning with the coming academic year in September, the School of Medicine will have facilities for medical education quite on a parity with those medical institutions which have contributed much to the development of medicine and surgery in the United States, and with whose graduates the product of the George Washington School has taken a place in the van in results before examining boards and in the field of medical endeavor. During the past year a reorganization of the teaching staff has been effected, new buildings and equipment have been added to the existing physical plant of the institution and many full-time additions to the teaching staff and faculty have been made. During the coming summer the old medical school building, with its administrative office, is to be remodeled and a new addition to the University Hospital is to be constructed. With the opening of school in September the new plant and teaching staff will be in operation and adequate opportunity will be provided for the most modern methods of teaching and scientific investigation. It is the purpose of the trustees of the University to continue the School of Medicine in its present improved location until such time as the new Medical Center becomes available. During the next three or four years the organization of the various departments, personnel and scientific laboratories will be perfected in view of moving the institution into its new home.

NEW BUILDINGS FOR SCHOOL AND HOSPITAL

A new laboratory building comprising an addition of about ten thousand square feet of space has been completed adjoining the old medical school building. The new building is now ready for occupancy and is fully equipped with modern facilities for teaching and research. This building has intercommunications with the old medical building on the second, third and fourth floors and its construction makes possible the reorganization of the fundamental scientific departments. With the remodeling of the old medical building, which will include the segregating of various departments (anatomy, pathology, physiology and pharmacology) on separate floors during the coming summer, the School of Medicine will possess adequate facilities for advancing rapidly its program in medical education and investigative work. The new building will also house a modern Central Laboratory to serve the University Hospital and the various clinical departments. Adjoining this laboratory is a fully equipped laboratory for the teaching of clinical microscopy; all under the supervision of a full-time director who will develop this work in the Department of Medicine. The new building also provides a large teaching laboratory for the Department of Bacteriology, Hygiene and Preventive Medicine as well as private offices and individual laboratories for the members of this department. On the fourth floor is provided ideal quarters for animals of all kinds and these facilities are available for all the departments of the school. This floor communicates with the fourth floor of the old medical school building where will be located the Department of Pathology. The third floor of the new building will communicate with the Department of Biochemistry, while the second floor communicates with the medical library, now remodeled and under the supervision of a trained librarian. In addition to the library in the remodeling of the second floor, there will be the Department of Physiology and Pharmacology. The building is equipped with modern laboratory furniture and fixtures as well as scientific equipment for both teaching and research.

Plans are now drawn for a new addition to the University Hospital building and this addition will be under construction in May. The first floor of the new addition will house the Department of Radiology, which will be newly and full equipped. A full time service in this department will be in operation by the first of September. The second floor of this addition will house the dispensary and double the space now devoted to this department in the hospital. The old dispensary will be remodeled to conform with the program for expansion in the new addition. New facilities and equipment will also be provided for this unit.

ADDITIONS TO THE FACULTY AND TEACHING STAFF

Under the reorganization of the School of Medicine, the faculty is composed of the executive officers of the various departments together with an elected member from each department. The teaching staff is composed of all the members of the teaching departments. The teaching staff functions through its various committees and the departments are under the control of the several executive officers. Several additions to the faculty and teaching staff have been made for the coming academic year and one sabbatical leave has been granted in the Department of Biochemistry. New additions to the full-time personnel include the following appointees:

Department of Physiology

Errett Cyril Albritton, A.B., M.D., Professor of Physiology and Executive Officer of the department, received his university education at the University of Missouri, being graduated in 1916. His medical degree was obtained from Johns Hopkins Medical School in 1921. He was a fellow of the National Research Council from 1922 to 1924 and for the past six years has been Professor of Physiology at the Chulalongkorn University Medical School, Bangkok, Siam, where he was sent by the Rockefeller Foundation. In 1925, Dr. Albritton served as a member of the International Health Board of the Rockefeller Foundation. His special fields of research have been in blood sugar physiology and the use of statistical methods in teaching and investigative work.

Chester E. Leese, Ph.D., Assistant Professor of Physiology, received his doctorate in physiology at Iowa State University and was an instructor in physiology at that institution for several years. For the past two years he has been a fellow of the National Research Council, working with Professor Cannon in the Department of Physiology at Harvard Medical School.

George Brewer, A.B., M.D., Instructor in Physiology, is a graduate of Johns Hopkins Medical School and his particular interests lie in clinical physiology.

Errett Cyril Albritton, A.B., M.D.
Professor of Physiology

Department of Biochemistry

Vincent du Vigneaud, Ph.D., Professor of Biochemistry and Executive Officer of the department. Dr. Joseph H. Roe, who occupies a professorial chair, has been granted sabbatical leave for the coming year to carry on advanced work at Yale University. Dr. du Vigneaud received his doctorate in biochemistry with Professor Murlin at the University of Rochester and later was a fellow of the National Research Council for two years. The first of these he worked with Professor Abel at Johns Hopkins Medical School and the second year he spent abroad. He comes to George Washington University from the University of Illinois where he has been associated with Professor Rose.

Vincent du Vigneaud, Ph.D
Professor of Biochemistry

Department of Bacteriology, Hygiene and Preventive Medicine

Roscoe Roy Spencer, M.D., Associate Professor of Hygiene and Preventive Medicine, obtained his medical training at Johns Hopkins Medical School and for the past seventeen years has been on the staff of the United States Public Health Service and for much of this time on duty in the National Institute of Health. His work on Rocky Mountain Spotted Fever is well known.

Leland W. Parr, Ph.D., Associate Professor of Bacteriology, obtained his doctorate in bacteriology with Professor Edwin O. Jordan at Chicago University in 1923. For several years he was Professor of Bacteriology in the American University in Beirut, Syria, and has recently been on a special research assignment with the International Health Division of the Rockefeller Foundation. His special interest is in general bacteriology.

John H. Hanks, Ph.D., Assistant Professor of Bacteriology, obtained his doctorate in bacteriology at the

Yale Medical School and has been a fellow of the National Research Council at Harvard Medical School during the past year. His field of work is immunology.

Elizabeth Verder, Ph.D., Assistant Professor in Bacteriology, obtained her doctorate at the University of Chicago in 1928. She will devote her entire time to research.

Alden F. Roe, Sc.D., Instructor in Bacteriology, obtained his doctorate at the University of Michigan and his special field of interest is Anaerobic bacteria.

Roscoe Roy Spencer, A.B., M.D.
Associate Professor of Hygiene and Preventive Medicine

Department of Pharmacology

Phoebe J. Crittenden, Ph.D., Instructor in Pharmacology, obtained her doctorate at Northwestern University.

In addition to the appointments enumerated, several fellows and assistants in biochemistry, bacteriology, physiology, pathology and pharmacology have also been appointed for the coming academic year. There remain, in addition, three other instructorships in the fundamental departments, yet to be appointed.

Teaching Staff for 1932–33

There follows a complete list of the teaching staff of the School of Medicine, George Washington University, for the coming academic year:

Anatomy

George Bain Jenkins, M.D., Professor of Anatomy, Executive Officer
William Binford King, A.B., M.D., Associate in Anatomy
Othmar Charles Solnitzky, Ph.D., M.D., Associate in Anatomy

Bacteriology, Hygiene and Preventive Medicine

Earl Baldwin McKinley, A.B., M.D., Professor of Bacteriology, Executive Officer
Roscoe Roy Spencer, A.B., M.D., Associate Professor of Hygiene and Preventive Medicine
Leland Wilbur Parr, Ph.D., Associate Professor of Bacteriology
John Harold Hanks, Ph.D., Assistant Professor of Bacteriology
Elizabeth Verder, M.S., Ph.D., Assistant Professor of Bacteriology
Alden F. Roe, Sc.D., Instructor in Bacteriology

Biochemistry

Vincent du Vigneaud, Ph.D., Professor of Biochemistry, Executive Officer
* Joseph Hyram Roe, Ph.D., Professor of Biochemistry
Oliver John Irish, M.S., Associate in Biochemistry
Harold Albert Craft, M.S., Associate in Biochemistry
Helen Marie Dyer, A.M., Associate in Biochemistry

Dermatology and Syphilology

Charles Augustus Simpson, M.D., Professor of Dermatology and Syphilology, Executive Officer
Harry Ford Anderson, M.D., Associate Professor of Dermatology and Syphilology
——————, Clinical Instructor in Dermatology and Syphilology
Herman Eugene Kittredge, M.D., Clinical Instructor in Dermatology and Syphilology
Elizabeth Emery Chickering, A.B., M.D., Clinical Instructor in Dermatology and Syphilology
George William Creswell, A.B., M.D., Clinical Instructor in Dermatology and Syphilology
Theodore Chen Fong, M.D., Clinical Instructor in Dermatology and Syphilology

Medicine

Walter Andrew Bloedorn, A.M., M.D., Professor of Medicine, Executive Officer
William Johnston Mallory A.M., M.D., Professor of Medicine
Coursen Baxter Conklin, A.M., M.D., Clinical Professor of Medicine
Roger Morrison Choisser, B.S., M.D., Associate Professor of Clinical Pathology

Frank Adelbert Hornaday, M.S., M.D., Assistant Professor of Medicine
Charles Robert Lee Halley, A.B., M.D., Associate in Medicine
John Alton Reed, A.B., M.D., Associate in Medicine
Watson William Eldridge, M.D., Associate in Medicine
Stuart Oliver Foster, A.B., M.D., Associate in Medicine
Herman Solomon Hoffman, A.B., M.D., Associate in Medicine
John Minor, A.B., M.D., Associate in Medicine
Maurice Protas, A.B., M.D., Associate in Medicine
Irving Brotman, M.D., Clinical Instructor in Medicine
Paul Frederick Dickens, B.S., M.D., Clinical Instructor in Medicine
William LeRoy Dunn, A.M., M.D., Clinical Instructor in Medicine
Harry Friedenberg, A.B., M.D., Clinical Instructor in Medicine
Bernard Lauriston Hardin, Jr., A.B., M.D., Clinical Instructor in Medicine
Robert Howe Harmon, A.B., M.D., Clinical Instructor in Medicine
Marvin McDugald McLean, M.D., Clinical Instructor in Medicine
Harry Arnold Hull McNitt, A.M., M.D., Clinical Instructor in Medicine
Nicholas Athanasiou Mandelos, M.D., Clinical Instructor in Medicine
John Charles Reisinger, M.D., Clinical Instructor in Medicine
Spencer Vincent Meade, M.D., Clinical Instructor in Medicine
George Arnold Holm, B.S., M.D., Clinical Instructor in Medicine

OPHTHALMOLOGY

William Thornwall Davis, M.D., Professor of Ophthalmology, Executive Officer
————, Assistant Professor of Ophthalmology
George Victor Simpson, M.D., Assistant Professor of Ophthalmology
Earnest Alfred Watson Sheppard, M.D., C.M., Clinical Instructor in Ophthalmology
Charles Louis Billard, M.D., Clinical Instructor in Ophthalmology
Frederick Leslie Benton, M.D., Sc.D., Clinical Instructor in Ophthalmology
Ralph Stevens Pendexter, LL.B., M.D., Clinical Instructor in Ophthalmology
William Thompson Burch, M.D., Clinical Instructor in Ophthalmology

OTO-RHINO-LARYNGOLOGY

William Beverly Mason, M.D., Professor of Oto-rhino-laryngology, Executive Officer
Daniel Bruce Moffett, A.B., M.D., Associate Professor of Oto-rhino-laryngology
William Herndon Jenkins, M.D., Clinical Professor of Oto-rhino-laryngology
Boyce Richardson Bolton, M.D., Assistant Professor of Oto-rhino-laryngology
David Davis, A.B., M.D., Associate in Oto-rhino-laryngology
Floyd McJunkin Allen, M.D., Associate in Oto-rhino-laryngology
Don R. Johnson, LL.B., M.D., Associate in Oto-rhino-laryngology
LeRoy Lee Sawyer, Jr., A.B., M.D., Clinical Instructor in Oto-rhino-laryngology
Aubrey David Fischer, M.D., Clinical Instructor in Oto-rhino-laryngology
Jeter Carroll Bradley, M.D., Clinical Instructor in Oto-rhino-laryngology

PATHOLOGY

Oscar Benwood Hunter, A.M., M.D., Professor of Pathology, Executive Officer
Leon Stuart Gordon, A.M., M.D., Associate in Pathology
William Franklin Sheridan, A.B., Instructor in Pathology
————, Instructor in Pathology

PEDIATRICS

Harry Hampton Donnally, A.M., M.D., Professor of Pediatrics, Executive Officer
Henry Cook Macatee, M.D., Clinical Professor of Pediatrics
Preston Alexander McLendon, B.S., M.D., Assistant Professor of Pediatrics
Loren Bascom Taber Johnson, B.S., M.D., Associate in Pediatrics
Edward Lewis, M.D., Associate in Pediatrics
Edward Ballard Broocks, M.D., Associate in Pediatrics
Charles Aurelius Schutz, A.B., M.D., Assistant Professor of Pediatrics
Margaret Mary Nicholson, A.B., M.D., Clinical Instructor in Pediatrics
Montgomery Blair, Jr., A.B., M.D., Clinical Instructor in Pediatrics
Aaron Nimetz, A.B., M.D., Clinical Instructor in Pediatrics
James Alfred Rolls, A.B., M.D., Clinical Instructor in Pediatrics

PHARMACOLOGY

George Byron Both, A.B., M.D., Professor of Pharmacology, Executive Officer
Phoebe J. Crittenden, Ph.D., Instructor in Pharmacology
James Holmes Defandorf, A.M., Associate in Pharmacology

PHYSIOLOGY

Errett Cyril Albritton, A.B., M.D., Professor of Physiology, Executive Officer
Chester E. Leese, Ph.D., Assistant Professor of Physiology
George Brewer, A.B., M.D., Instructor in Physiology
————, Instructor in Physiology

NEUROLOGY

Walter Freeman, Ph.D., M.D., Professor of Neurology, Executive Officer
Karl Herman Langenstress, M.D., Associate Professor of Neuro-pathology
Herbert Hermann Schoenfeld, M.D., Associate in Neurology
Hyman David Shapiro, M.D., Clinical Instructor in Neurology

OBSTETRICS AND GYNECOLOGY

Radford Brown, M.D., Professor of Obstetrics and Gynecology, Executive Officer

Howard Francis Kane, A.B., M.D., Professor of Obstetrics and Gynecology
Elijah White Titus, Phar. D., M.D., Clinical Professor of Obstetrics and Gynecology
Jacob Kotz, M.D., Clinical Professor of Obstetrics and Gynecology
Richard Lee Silvester, M.S., M.D., Associate in Obstetrics and Gynecology
Henry Lauran Darner, A.B., M.D., Associate in Obstetrics and Gynecology
William Preston Haynes, A.B., M.D., Associate in Obstetrics and Gynecology
George Nordlinger, A.B., M.D., Associate in Obstetrics and Gynecology
Herbert Percy Ramsey, A.B., M.D., Associate in Obstetrics and Gynecology
William Raymond Thomas, M.D., Associate in Obstetrics and Gynecology
Joseph Harris, A.B., M.D., Clinical Instructor in Obstetrics and Gynecology
Laurence Lee Cockerille, M.D., Clinical Instructor in Obstetrics and Gynecology
Edmund Murdaugh Ellerson, M.D., Clinical Instructor in Obstetrics and Gynecology
Clayton Howard Hixson, M.D., Clinical Instructor in Obstetrics and Gynecology
Russel Jon Jansen, M.D., Clinical Instructor in Obstetrics and Gynecology
Helen Gladys Kain, B.S., M.D., Clinical Instructor in Obstetrics and Gynecology
Esther Alsylvia Nathanson, A.B., M.D., Clinical Instructor in Obstetrics and Gynecology
Henry John Russell McNitt, B.S., M.D., Clinical Instructor in Obstetrics and Gynecology
Bernard Notes, M.D., Clinical Instructor in Obstetrics and Gynecology

PSYCHIATRY

William Alanson White, A.M., M.D., Professor of Psychiatry, Executive Officer
Roscoe Willis Hall, Ph.B., M.D., Clinical Professor of Psychiatry
Nolan Don Charpentier Lewis, M.D., Clinical Professor of Psychiatry
Paul Jacob Ewerhardt, M.D., Clinical Instructor in Psychiatry
John Edward Lind, M.D., Clinical Instructor in Psychiatry
Harriet Elizabeth Twombley, A.B., M.D., Clinical Instructor in Psychiatry
Addison McGuire Duvall, M.D., Clinical Instructor in Psychiatry
Winifred Richmond, Ph.D., Clinical Instructor in Psychiatry
Samuel Alexander Silk, M.D., Clinical Instructor in Psychiatry

RADIOLOGY

Arthur Carlisle Christie, M.S., M.D., Professor of Radiology, Executive Officer
Thomas Allen Groover, M.D., Sc.D., Clinical Professor of Radiology
Isidore Lattman, M.D., Associate in Radiology
Edgar Meredith McPeak, M.D., Associate in Radiology

SURGERY

Charles Stanley White, M.D., Professor of Surgery, Executive Officer
Daniel LeRay Borden, A.M., M.D., Associate Professor of Surgery
James Fernandez Mitchell, A.B., M.D., Clinical Professor of Surgery
Harry Hyland Kerr, M.D., C.M., Clinical Professor of Surgery
Paul Sterling Putzki, M.D., Assistant Professor of Surgery
Arch Lockhart Riddick, A.B., M.D., Assistant Professor of Surgery
William Berry Marbury, M.D., Assistant Professor of Surgery
Custis Lee Hall, M.D., Assistant Professor of Surgery
John Hugh Lyons, M.S., M.D., Associate in Surgery
Cline N. Chipman, M.D., Associate in Surgery
Guy Whitman Leadbetter, B.S., M.D., Associate in Surgery
William Warren Sager, M.S., M.D., Associate in Surgery
Benjamin Franklin Dean, Jr., A.B., M.D., Associate in Surgery
Alec Horwitz, M.S., M.D., Associate in Surgery
Harold Walter Krogh, D.D.S., Associate in Surgery
Charles Wilbur Hyde, M.D., Clinical Instructor in Surgery
Otto Nellis Warner, M.D., Clinical Instructor in Surgery
Francis George Speidel, M.D., Clinical Instructor in Surgery
Philip Oscar Pelland, M.D., Clinical Instructor in Surgery
Stewart Maxwell Grayson, M.D., Clinical Instructor in Surgery
James Houston Hawfield, M.D., Clinical Instructor in Surgery
Nathan Norman Smiler, M.D., Clinical Instructor in Surgery
Richard Knight Thompson, D.D.S., Clinical Instructor in Surgery
Howard Lee Smith, M.D., Clinical Instructor in Surgery
Edward Alexander Cafritz, M.D., Clinical Instructor in Surgery
Hazen Eugene Cole, M.D., Clinical Instructor in Surgery
Harry Kaplan, D.D.S., Clinical Instructor in Surgery
William Wiley Chase, A.B., M.D., Clinical Instructor in Surgery
Valentine Martin Hess, M.D., Clinical Instructor in Surgery
Julius Salem Neviaser, A.B., M.D., Clinical Instructor in Surgery
James Lloyd Collins, M.D., Clinical Instructor in Surgery

UROLOGY

Francis Randall Hagner, M.D., Professor of Urology, Executive Officer
Frederick August Reuter, M.D., Clinical Professor of Urology
Homer Gifford Fuller, Ph.B., M.D., Clinical Professor of Urology
Thomas Carlton Thompson, B.S., M.D., Associate Professor of Urology
Alan Jeffries Chenery, M.D., Associate in Urology
Charles Perry Howze, M.D., Associate in Urology
Miles Parker Omohundro, M.D., Associate in Urology
Lyle Millan Mason, M.D., Clinical Instructor in Urology
Gilbert Ottenberg, A.M., M.D., Clinical Instructor in Urology
Norvell Belt, A.B., M.D., Clinical Instructor in Urology
William Glenn Young, M.D., Clinical Instructor in Urology

* On sabbatical leave, 1932–33.

CHANGES IN MEDICAL CURRICULUM

A two semester year is the plan adopted; each semester to consist of 16 weeks with a one week examination period following. Important innovations in course of study follow:

Gross and Neural Anatomy, Histology and Embryology: First semester, first year.
Regional Anatomy: Second semester, first year.
Functional and Surgical Anatomy in collaboration with the clinical departments: Second year.
Bacteriology: First year.
Physiology and Biochemistry (Introductory Course): Second semester, first year.
Medical and Surgical Clinics (Classical cases of disease which can be understood with a background of body structure): Second semester, first year.
Medical Psychology: ("Normal mind functions," paralleling study of the normal body): First year.
History of Medicine: (An elective course): First year.
Physical Diagnosis: First semester, second year.
Psychopathology: Second year. (Paralleling course in Pathology.)
Hygiene (Including course on public relations and consideration of medical economics.): Second year.
Preventive Medicine (From studies in clinics and dispensary, lecture room and laboratory): Third year.
A Course in the Emotional Life of the Child—Department of Pediatrics: Fourth year.
Clinics predominate third and fourth years with prospective elimination of didactic teaching.

A general University policy includes the fundamental science department, Bacteriology, Hygiene, Biochemistry and Physiology in the Graduate Council in the University. Candidates for M.S. and Ph.D. degrees will be accepted in these departments for credits in graduate work. Special courses are opened to University registrants.

FELLOWSHIPS AND ASSISTANTSHIPS

Three fellowships have been granted in Biochemistry and provision has been made for graduate assistantships in Biochemistry, Bacteriology, Hygiene and Preventive Medicine, Physiology, Pathology, Pharmacology and Anatomy.

RESEARCH GRANTS

For the coming year the School of Medicine has received a research grant for special work in the Department of Neurology from the Josiah Macy, Jr. Foundation in New York. Other grants are pending.

GENERAL COMMENT

The reorganization of the School of Medicine and the developments described are in line with the policy of the George Washington University to build its program of medical education into the general approved scheme of medical education as it exists today in the United States. This can only be accomplished by the true University Medical School emphasizing quality alone in both teaching and productive scholarship. A limitation of the first year class to eighty students for 1932–1933 is accepted as necessary for meeting the recognized requirements of efficiency.

PROGRAM, SOCIETY ACTIVITIES MAY, 1932

May 4: Annual Meeting.
May 11: Case Report. Pneumococcus Meningitis in a Two-Day-Old Infant. Dr. E. Clarence Rice.
Case Report. Post-Operative Liver Abscess. Dr. J. Lloyd Collins, Gallinger Hospital.
Urinary Proteose in Dermatoses. Dr. F. J. Eichenlaub.
May 18: Clinical Studies of the Female Sex Hormones. Dr. Robert T. Frank of New York City.
May 25: Presidential Address, "The General Practitioner and the People's Health."

ACTIVITIES OF MEMBERS OF MEDICAL PROFESSION AND ALLIED SCIENCES OF THE DISTRICT OF COLUMBIA IN RECENT CONVENTIONS

Several members of the Society are participating in the various large medical conventions being held in April and May of this year. Following is a list of these members and the subjects which they will present.

AMERICAN MEDICAL ASSOCIATION

New Orleans, May 9 to 13

Exhibits:

Exhibit on Poliomyelitis. R. C. Williams, Chairman of Committee.

J. P. Leake. Paralytic Diagnosis.

G. A. Wheeler and W. H. Sebrell. Pellagra. Exhibit showing distribution, seasonal variation, experimental production, prevention and treatment of pellagra by diet. Exhibit also shows the production, prevention and treatment of the experimental disease in dogs and albino rats, with a demonstration of evidence that the disease is due to lack of a specific accessory food factor.

P. B. Matz. Studies of (1) arthritis; (2) cancer; (3) manic depressive psychosis. Exhibit of charts showing "extensive" and "intensive" clinical and statistical approaches to the disease under consideration.

J. Bay Jacobs. Female Pelvis and Its Relationship to the Mechanism of Labor. Exhibits of drawings, roentgenograms and a small motion picture illustrating modern methods of internal pelvimetry.

Fred O. Coe and L. S. Otell. Hepatosplenography. Exhibit of roentgenograms showing liver and spleen following injection of thorium dioxide contrast medium.

Papers:

Wm. T. Davis. Metastatic Carcinoma of the Optic Disk. Report of a case. (Lantern Demonstration).

A. S. Rumreich. Typhus-Rocky Mountain Spotted Fever Group: Developments in Epidemiology and Clinical Considerations (Lantern demonstration).

R. Lyman Wilbur opened the discussion on paper by G. F. Boudreau of Geneva, Switzerland, entitled "Relation of Private Practice to Preventive Medicine in Europe."

Boliver J. Lloyd opened the discussion on paper by T. P. Hughes and W. A. Sawyer, entitled "Significance of Immunity Tests in Epidemiology as Illustrated in Yellow Fever (Lantern demonstration)."

G. A. Wheeler and W. H. Sebrell, Jr. The Control of Pellagra.

W. M. Yater and L. S. Otell. The Differential Diagnosis of Diseases of the Liver and Spleen with the Aid of Roentgenography After the Intravenous Injection of Thorium Dioxide. (Lantern demonstration). Wm. Gerry Morgan opened the discussion.

Arthur C. Christie. Requirements for Practice of Radiology.

Walter L. Treadway. Drug Addiction in the United States.

W. M. Yater opened the discussion of Dr. C. W. Barrier's paper entitled "The Effect of Digitalis in Cardiac Arrhythmias other than Flutter and Fibrillation of the Auricles." (Lantern demonstration).

M. C. Hall. Principles and Practices in Anthelmintic Medication.

Joseph S. Wall participated in the discussion of a paper read by Charles G. Kerley of New York, entitled "Intestinal Stasis in Children."

Frank Leech, at the session of the Section on Diseases of Children, read a tribute to the memory of the late Dr. Stafford McLean.

Notes

Section on Pediatrics: Through action of the House of Delegates the Section on Diseases of Children will be officially known as the Section on Pediatrics.

Wins Place in Tourney

Dr. S. B. Muncaster gained second place in a contest over an eighteen hole course among entrants having at least reached their 60th year, who are members of the American Medical Golf Association.

MEMBERS OF THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA IN ATTENDANCE AT

THE A. M. A. CONVENTION, NEW ORLEANS, 1932

Anna Bartsch-Dunne
Harry S. Bernton
Arthur C. Christie
Coursen B. Conklin
Edgar P. Copeland
Hugh S. Cumming
Wm. Thornwall Davis
Walter Freeman
Louis S. Greene
Merritte W. Ireland
J. Bay Jacobs
Louise Tayler-Jones
James P. Leake
Frank Leech (Alternate Delegate)
B. J. Lloyd
Henry C. Macatee (Delegate)
George W. McCoy
S. B. Muncaster
Margaret M. Nicholson
Mary O'Malley
Joseph S. Wall
Wallace M. Yater

The total registration for the New Orleans session was 2,752. The 1933 meeting will be held in Milwaukee. Dr. Dean Lewis, of Baltimore, was made President-elect upon ballot in the House of Delegates.

THE AMERICAN ACADEMY OF PEDIATRICS

New Orleans, May 12–14

At the second annual meeting of the American Academy of Pediatrics round table discussions were held at the New Orleans Country Club. Subjects with the leader of the discussion follow: "Allergy," Dr. Bela Schick; "Rheumatic Infections," Dr. John L. Morse; "Poliomyelitis," Dr. Louis C. Schroeder; "Pyuria in Childhood," Dr. H. F. Helmholz; "Disorders of the Blood and the Hemopoietic Organs," Dr. Thomas B. Cooley; "Scarlet Fever," Dr. John A. Toomey; "Respiratory Infections," Dr. Isaac A. Abt.

Of particular interest was an address given on the afternoon of May 14 by Arthur I. Kendall, M.D., Ph.D., Dr. P.H., Professor of Bacteriology, Northwestern University Medical School, Chicago, entitled "Filterable Bacteria and Their Significance." The phenomena described by Doctor Kendall may well tend to revolutionize previously held concepts in bacteriology.

Dr. John L. Morse, of Boston, read his presidential address. Dr. Samuel McC. Hamill, of Philadelphia, was elected as the successor in office of Doctor Morse. The Secretary of the Academy is Dr. Clifford G. Grulee.

The country is divided into five regional districts. The District of Columbia has Dr. Lewis C. Schroeder, Assistant Professor of Pediatrics, Cornell University Medical College, as Chairman of its regional committee. Other chairmen of regional committees are Drs. Lawrence T. Royster, C. A. Aldrich, Wm. Palmer Lucas and Frederick F. Tisdall.

Noted in attendance at these meetings were Drs. Edgar P. Copeland, Frank Leech and Joseph S. Wall.

AMERICAN HEART ASSOCIATION

Annual Meeting May 10, New Orleans

W. M. Yater presented a paper on "The Mechanism of the Adjustment of the circulation in Hyperthyroidism."

AMERICAN SOCIETY FOR CLINICAL INVESTIGATION

Annual Meeting, May 2, Atlantic City

W. M. Yater, J. Markowitz and R. F. Cahoon presented a paper on "The Consumption of Blood Sugar by Muscle in the Non-Diabetic and Diabetic State."

AMERICAN PHYSIOLOGICAL SOCIETY

Annual Meeting, April 28–30

Theodore Koppanyi, Ph.D., Georgetown University School of Medicine, presented a paper entitled "Studies on the Synergism and Antagonism of Drugs."

J. Markowitz and W. M. Yater. "The Post-Operative Behaviour of Dogs Dehapatized by a New One-Stage Method."

AMERICAN SOCIETY OF BIOLOGICAL CHEMISTS

Philadelphia, April 28–30

M. X. Sullivan and W. C. Hess. "Studies in Arthritis."

M. X. Sullivan and W. C. Hess. "Colorimetric Proof of the Structure of Glutathione. Demonstration."

M. X. Sullivan, W. C. Hess and E. I. Evans. "Experimental Cystinuria in Rabbits and Dogs. Demonstration."

DR. WM. GERRY MORGAN HONORED

Dr. Wm. Gerry Morgan, dean of the Georgetown University School of Medicine, and past president of the American Medical Association, a member of the Society, has recently been elected to the position of Secretary General of the American College of Physicians to succeed George Morris Piersol, M.D., who was elected President of the College.

REPRINTS RECEIVED

The following reprints have recently been received for which due acknowledgment is made:

"Transurethral Resection of the Prostate. Report of Cases." Virginia Medical Monthly, April, 1932, by W. Calhoun Stirling, M.D., F.A.C.S.

"The Effects of Unrelieved Prostatic Obstruction," Southern Medical Journal, Birmingham, Alabama, January, 1932, by W. Calhoun Stirling, M.D., F.A.C.S.

"Total Rupture of the Kidney: Report of Cases," Virginia Medical Monthly, March, 1932, by W. Calhoun Stirling, M.D., F.A.C.S.

"Nervous Diseases Among Children: A Review of Admissions to the Children's Hospital, Washington, D. C., 1925–1930," Southern Medical Journal, July, 1931, by Daniel D. V. Stuart, Jr., M.D.

"Perennial Hay Fever," Archives of Otolaryngology, February, 1932, by Grafton Tyler Brown, M.D.

"Masked Gastro-Intestinal Hyperthyroidism. Report of Thirty-four Cases," Journal of the American Medical Association, August 22, 1931, by J. Russell Verbrycke, Jr., M.D.

"Congenital Syphilis of the Stomach," American Journal of Syphilis, October, 1929, by J. Russell Verbrycke, Jr., M.D.

"The Implantation of Biliary Fistulas," Surgery, Gynecology and Obstetrics, January, 1932, by Edmund Horgan, M.D., F.A.C.S.

GREATER NATIONAL CAPITAL COMMITTEE

Participation by Medical Profession

About one year ago The Greater National Capital Committee, composed of about five hundred persons, organized to sell the National Capital to the country as a convention center and as a mecca for tourists. Mr. Robert B. Fleming acted as Chairman and he had associated with him Mr. Lloyd B. Wilson, Mr. E. L. Moorman, Mr. E. C. Graham, Mr. Merle Thorpe and many other prominent citizens of Washington.

The Committee went to work with a will and results were obtained that surpassed the predictions of the most optimistic. It brought more than ten million dollars new money to Washington in less than a year and the cost was four-tenths of a cent for each dollar.

The Greater National Capital Committee has established information booths in the suburbs of Washington and the Union Station and each visitor that applies for information, on his return home, receives a letter from the Committee asking of his impression of Washington, in what way the Committee could be of greater service, and soliciting suggestions to be helpful to visitors. This follow-up has been highly successful, if one may judge by the correspondence which follows. This is only one of the many ways in which the Committee is working. Thirty-five hundred reservations in Washington hotels were made by these booths and there are many other activities along the same line which testify to the efficient management of the Committee's work.

To carry on this work money is needed, which is not provided in the city budget, and it must therefore be raised by voluntary contributions. Therefore, each group of business and professional men has been asked to contribute to this fund. Among the physicians, it is proposed to raise fifteen hundred dollars. This does not seem a large sum for six hundred men to contribute; two and a half dollars from each member would be sufficient to pay our part.

Many physicians will ask, "How will I be benefited and why should I contribute?" The prosperity of the city is reflected in every inhabitant of that city, whether he be a newsboy or a banker. While the tangible return may not be evident, ten million dollars can not be spent in Washington without physicians being indirectly benefited in some manner. The mere fact that a physician's patient is more prosperous permits him to pay his bills and perhaps engage the service of a specialist for some surgical work that may be necessary but not urgent. In a time of depression he would put off indefinitely any medical care that could be postponed. If the merchant's business is prospering, he will necessarily be distributing money, either by the purchase of goods, paying of salaries, or buying the necessities of life. There is every reason why the physician should sponsor this movement in a substantial way.

A new campaign started in April and each member of the Society will receive a card on which to place his subscription. Mail the card to the Treasurer of the Committee at once.

Chas. S. White,
Chairman.
Arthur C. Christie,
Associate Chairman.

ANNUAL MEETING, MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

The Annual Meeting of the Medical Society of the District of Columbia on May 4–5, 1932, witnessed a most successful gathering, not only of members of the Society but of physicians from the environs of Washington. In the auditorium during the reading of Dr. Joseph F. McCarthy's paper, over 300 were present. It may be well said that this year's meeting sets a high mark both in attendance and in the quality of the many exhibits presented under the general direction of Dr. Eugene R. Whitmore. At the luncheon at the Mayflower on Wednesday, 275 were seated at the tables. A pleasing innovation was a humorous address given by Rev. Allen A. Stockdale. There was a total registration of 351. Many physicians from the governmental service, particularly those holding high office, filled out cards of registration at this session. Numerous letters have been received from the Society's guests, as well as from technical exhibitors, expressing their thanks and satisfaction for having been in attendance.

TRANSACTIONS OF THE SOCIETY

Stated Meeting, May 4, 1932

The following were duly elected to membership:

Active Members

Edward Joseph Cummings, 1835 Eye Street, N. W.
Richard Joseph Kemp, 1746 K Street, N. W.
John P. H. Murphy, St. Elizabeth's Hospital
Philip Archibald Eustace Stebbing, 8 Eighth Street, S. E.
Frank Hough Towner, 1613 Harvard Street, N. W.

Associate Members

C. Willard Camalier, D.D.S., 1726 Eye Street, N. W.
Addison McGuire Duval, St. Elizabeth's Hospital
Frank Herbert Edmonds, Optician, 915 Fifteenth Street, N. W.
Ralph Harvard Goldthwaite, Walter Reed General Hospital
Joseph Raymond B. Hutchinson, 302 Fifth Street, N. E.
Robert Francis Jones, Naval Dispensary
William Harrison Norton, 3631 Thirty-fourth Street, Mt. Ranier, Maryland.
Cleve C. Odom, Walter Reed General Hospital
Walter Clifton Royals, Walter Reed General Hospital.
Isaac Judah Silvermann, Gallinger Municipal Hospital

Reinstated to Active Membership

Alfred V. Parsons, Takoma Park, D. C.

Applicants for membership to be voted on in November, 1932:

For Active Membership

Isadore Meyer Alpher, George Washington University—1929
Carleton William Bullard, University of Buffalo—1923
James Roger Costello, Georgetown University—1925
Bernard Lauriston Hardin, Jr., Johns Hopkins University—1929
Eugene Stuart Lyddane, Georgetown University—1929
Edgar Elias Quayle, Hahnemann Medical College—1926

For Associate Membership

John Robert DeFarges, D.D.S., George Washington University—1901
Charles A. Goettling, University of Maryland—1910
Archie Burton Hooton, Medical College of South Carolina—1912
Shelley U. Marietta, University of Illinois—1909
Luther Raymond Poust, Medico Chirurgical College, Philadelphia—1909

Resignations recently accepted:

Active Members

T. Wm. Brockbank
Henry G. Hadley
Dunlap P. Penhallow

Associate Members

George F. Cottle
Ramsay Spillman
Wm. H. H. Turville

NEWLY ELECTED OFFICERS, 1932–33

President, Harry Atwood Fowler
First Vice President, Henry R. Schreiber
Second Vice President, H. Gladys Kain
Secretary-Treasurer, Coursen B. Conklin
Members of the Executive Committee (To serve three years from July 1, 1932): Arthur C. Christie, Harry Saul Bernton, Janvier W. Lindsay
Member of the Program Committee (To serve three years from July 1, 1932): Daniel LeRay Borden

CONTAGIOUS DISEASE REPORT
MARCH, 1932

Health Department, District of Columbia

	Morbidity	*Mortality*
Diphtheria	45	2
Scarlet Fever	146	5
Measles	10	0
Whooping Cough	99	1
Chicken Pox	178	0
Typhoid Fever	7	1
Poliomyelitis	1	0
Epidemic Cerebro-Spinal Meningitis	11	2
Smallpox	0	0
Influenza	36	19
Pneumonia (All forms)	213	98
Pellagra	1	2
Encephalitis Lethargica	1	1
Typhus Fever	0	0
Syphilis	374	6
Gonorrhea	200	1
Chancroid	6	0
Tuberculosis (All forms)	79	75

CONTAGIOUS DISEASE REPORT
APRIL, 1932

Health Department, District of Columbia

	Morbidity	*Mortality*
Diphtheria	33	1
Scarlet Fever	113	0
Measles	42	0
Whooping Cough	111	3
Chicken Pox	145	0
Typhoid Fever	1	0
Poliomyelitis	1	0
Epidemic Cerebro-Spinal Meningitis	3	2
Smallpox	0	0
Influenza	10	8
Pneumonia (All forms)	130	65
Pellagra	0	0
Encephalitis Lethargica	1	1
Typhus Fever	0	0
Syphilis	325	9
Gonorrhea	174	0
Chancroid	2	0
Tuberculosis (All forms)	118	47

TUBERCULOSIS ABSTRACTS

This Review Issued Monthly by the National Tuberculosis Association is Furnished by the Association for the Prevention of Tuberculosis of the District of Columbia.

NEWSPAPERS thrive because man's appetite for the new is insatiable. Yesterday's happenings taste flat today and are forced off the front page to make way for today's latest gossip. In medicine, news is as eagerly embraced. Not, however, to satisfy a childish desire for the novel but rather because existing knowledge is never complete enough to satisfy. Our fight against tuberculosis is, at best, a compromise because our diagnostic and therapeutic weapons are still inadequate. We need new knowledge to supplement the old. In fact, every doctor owes to his patient the obligation to keep abreast of the times. David A. Stewart, veteran pioneer of the tuberculosis movement in Canada, recently reviewed advances made in tuberculosis, excerpts of which are here presented.

WHAT IS NEW IN TUBERCULOSIS

The strategy of our campaign against tuberculosis is new. Our old objective was to heal the sick man who came to the doctor of his own accord because he was sick. He seldom came early because he had few symptoms or none. Our new objective is to find the men, the women, and especially the children who have been in contact with the sick man. Management of the individual case is not enough; we now ask, "Who have been *seeded* by this man's infection, and what can we do for *them*?"

The kinds of people we have to diagnose are new. When the doctor goes scouting among contacts he finds that all his decisions are more difficult. He finds also that "the fountain pen is mightier than the stethoscope" because the history of tuberculosis in the family is so important. Probe deeply with your pen; nor be satisfied until you have all the family chest portraits in your X-ray album. Grandmother's "stomach cough," when the X-ray has passed upon it, may explain the indefinite illnesses of half a dozen grandchildren.

NEW IN DIAGNOSIS

A revolutionary change in diagnosis is the comparative eclipse of the stethoscope by the X-ray plate. The stethoscope is still useful but not an instrument of precision. It leaves half of our chest problems untouched. It can but rarely find early tuberculosis and probably never earliest tuberculosis. It cannot follow at all accurately the progress of disease or of healing. Nearly all the questions we need to ask are answered more clearly by the X-ray plate. Of course the X-ray plate must be well made and well read lest blind leaders lead the blind into diagnostic ditches.

Opaque oil, such as lipiodol, is a wonderful help in differentiating from tuberculosis a condition which is considered rare but which is really common, namely, bronchiectasis. This new diagnostic measure has had its full share of misuse and misinterpretation.

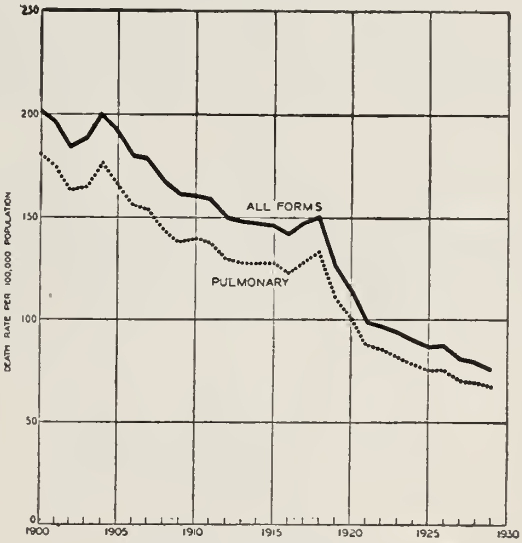
The bronchoscope is coming more into use as a chest instrument but has still a broad field to cultivate.

Examination of the sputum is as essential as ever. But now we are not satisfied with a single or a dozen negative findings, for that settles nothing. Now we incubate and grow the germs on potato medium.

The tuberculin test is perennially new, and it is more prognostic than diagnostic. A tuberculin reaction in an adult is something like a vaccination scar. When a young child reacts to tuberculin he should be thoroughly examined and closely watched, and his whole household examined, too.

NEW IN TREATMENT

"Outdoorness" is not a specific for tuberculosis but a natural advantage which all living people should have, especially the chronically sick. Sunlight treatment is still empirical but useful as a general tonic. He who would use it safely must know its indications and contraindications, its therapeutics, dosage and toxology. Light has been over-praised and abused. It should be applied in measured doses, in well selected cases and always watchfully.



TUBERCULOSIS DEATH RATES
U. S. Registration Area, 1900-1929

Rest is still the great basis of all treatment of tuberculosis. Fatigue makes ill; rest makes well. Tuberculosis can be cured, but the prices to pay are time and patience, and the foundation is rest. But at last pulmonary tuberculosis has found a "specific." It is collapse or compression of the diseased lung or lungs, which is simply a local application of rest. Artificial pneumothorax is not new but the widening of its scope is. Phrenic paralysis to raise the diaphragm and thoracoplasty to collapse the chest wall are new and their scope widens daily. Artificial pneumothorax is being applied earlier and earlier and later and later. Using it in early stages is not using a sledge hammer to drive a tack, because pneumothorax is not a sledge hammer and any definite focus of tuberculosis is not a tack. Pneumothorax has no features that can be called bad, except the formation of fluid in some cases. The best indication is the lack of contraindications and there are no contraindications. Hemorrhages or expectoration with bacilli or beginning cavitation—even a small cavity—urge pneumothorax.

In late, neglected, or advancing disease the prognosis goes up many points when collapse is possible for the worse lung, and is improved even more proportionally when both of two bad lungs can be collapsed. We now freely apply some collapse to both lungs and even put men with double collapse to work. The more passive measures called *taking the cure* must now be supplemented by active measures of *giving the cure.* "Milk, eggs, and the back verandah" never was a reasonable formula and now is hopelessly obsolete.

NEW ABOUT COMPLICATIONS

We believe now that tuberculosis in the intestine is almost as treatable and curable as tuberculosis in the lung—if we make the diagnosis and apply the treatment soon enough. Early diagnosis of tuberculous enteritis can be made only by the X-ray. The author gives barium meals as a routine in all cases of pulmonary tuberculosis. Treatment is begun early and the old picture is seldom seen except in a patient neglected to sheer hopelessness before treatment is begun. Treatment includes a smooth diet, light therapy, and all general measures made more intensive.

The larynx is the doorstep of the lung. Good treatment for the lung is the best element in treatment of the larynx. Collapse treatment has done much to reduce tuberculosis in the larynx from a major complication almost to a minor one. Add to that rest, silence, and sun applied carefully.

The red terror of hemorrhage is tamed. Half the pharmacopeia has been tried and has failed or done harm. The worst modern mistreatment of hemoptysis is morphine, though a little heroin to *modify* (not stop) cough is valuable. Ice bags on the chest are of the devil. The modern treatment for hemorrhage is rest, reassurance, a little heroin, mild laxatives, bland foods—and the *specific.* That specific is collapse therapy.

NEW LIGHT ON CHILDREN

Most important of all is the new light on tuberculosis in children. Our ideas about children lagged a generation behind our knowledge about adults, chiefly because we had a single standard for measuring disease in the adult and the child. But the two types are almost two diseases, so different that they have little more than the causal organism in common. Diagnosis, treatment, and prognosis all differ as between the young and the older. Symptoms in the childhood type are absent or slight and no single symptom is pathognomonic. The physical examination cannot disclose it. But the great *new light* is shed by the X-ray.

"The discovery of the child in tuberculosis opens up a great new continent for exploration. It is in this new continent of childhood that the most fruitful exploration of the antituberculosis forces will be made during the next generation. . . . . What we wish to do for the race must be done for the child. On their behalf we must even learn a good part of our tuberculosis all over again."—*What is New in Tuberculosis, David A. Stewart, The Canadian Med. Assn. Jour., January, 1932.*

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THE CAUSE OF HEART FAILURE IN HYPERTHYROIDISM*

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It is important to remember that hyperthyroidism, either in the form of exophthalmic goiter or adenomatous goiter with superimposed thyrotoxicosis, may be complicated by congestive heart failure, since relief from the hyperthyroidism often allows the heart to regain compensation. It is the one form of heart disease which can be permanently cured by treatment. Its incidence, however, is far less than that of any of the main forms of heart disease, viz., rheumatic endocarditis, hypertensive heart disease, coronary sclerosis and syphilitic aortitis with regurgitation. It must be remembered that while cardiac over-activity is a constant concomitant of hyperthyroidism and causes many of the symptoms of the disease, such as tachycardia, palpitation, loud heart sounds, moderately elevated systolic blood pressure and dyspnea, these are not to be construed as symptoms of heart failure. It is only when congestion of organs occurs that heart failure may be said to exist in hyperthyroidism, and this has been shown by many authors not to be an early or even a frequent complication of the condition. It is my purpose to discuss the reason for this infrequency and the cause of congestive heart failure when it does occur.

In the first place, what is the cause of the cardiovascular manifestations of hyperthyroidism? To answer this question I must refer to the nature of hyperthyroidism and to recent investigative work. Hyperthyroidism, without reference to the form, is a condition in which for some unknown reason there is an increase in the thyroxine content of the tissues throughout the body, which results in an increased rate of metabolism. A heightened rate of metabolism in the heart, which is a constantly pulsating organ, would theoretically be manifested by an increased irritability and thus an increased rate of pulsation, and by an increased tone which would mean augmented force of contraction. The tachycardia which is such a constant symptom in hyperthyroidism has in fact recently been shown to be due to the direct effect of the excessive amount of thyroxine upon the myocardium and not to stimulation of the sympathetic nerves. This fact was demonstrated by J. K. Lewis and McEachern; Priestly, J. Markowitz, and Mann; Yater; McIntyre; C. Markowitz and Yater. The tachycardia is, therefore, not a compensatory phenomenon but is merely a result of hyperthyroxinization of the heart. That the heart not only beats constantly faster than normally but more forcibly is indicated by observation of the isolated perfused hearts of thyroxinized rabbits, by the loudness of the heart sounds in patients and by the increase in the systolic blood pressure which occurs in the face of general arteriolar relaxation.

Reliable investigators have shown that in hyperthyroidism the minute volume output of the heart is increased and the rate of blood-flow through the pulmonary and systemic circulations accelerated (Plesch; Blalock and Harrison; Blumgart, Gargill and Gilligan; and others).

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* Read at the Annual Meeting of the Society, May 5, 1932.

Such findings were not surprising, since an increased utilization of oxygen when metabolism is speeded up presupposes an increased supply. It is my belief, however, that this necessary increase in rate of circulation is not physiological but accidental. The reflex mechanism which exists to bring about an increased blood-flow in muscular exercise, in which metabolism is accelerated physiologically, is not present in hyperthyroidism. In exercise more blood is brought to the heart because of the squeezing action of the contracting muscles on their blood vessels and the sucking action of faster and deeper respirations, and if the heart is normal it will pump out all of the blood brought to it. In hyperthyroidism, however, there is an increase in tissue oxidation without the corresponding muscular activity, and the respirations are not greatly increased in rate or depth. The increase in amount of blood reaching the heart and leaving it is due mainly to the acceleration in rate of heartbeat and the augmented vigor of contraction of the heart. These factors, as has been said, are due entirely to the increase in thyroxine content of the myocardium. If they did not coexist with the increase in rate of metabolism of the tissues generally, there would be very little if any increase in the amount of oxygen delivered to the tissues, and the patient would perhaps suffer from tissue anoxemia.

Although it is a fortuitous circumstance, the heart is working constantly harder than normally. Why, therefore, does it not hypertrophy more than it does—the average increase in weight at necropsy is only 15 per cent—and why does it not fail more often? The first question is answered by stating that although the amount of blood pumped out by the heart each minute is increased, depending upon the degree of hyperthyroidism, it is pumped out against a diminished resistance. There is general vascular relaxation due to the effect of the metabolites of increased combustion upon the arterioles and capillaries of the tissues. Consequently, blood courses through the tissues more easily than normally and hypertrophy of the heart is not necessary. The second question is answered by the statement that, although the heart is actually doing more work, it is at the same time getting an abundance of oxygen, and reparative processes keep pace with catabolic processes, at least as long as there is not a great deal of chronic malnutrition of the body as a whole.

After such answers as these one might ask a corollary question, why, then, does the heart ever fail in hyperthyroidism? This question is still more pertinent when one knows a fact which I have discovered, namely, that the isolated perfused hearts of rabbits kept in a state of hyperthyroidism for long periods of time by repeated intravenous injections of thyroxine continue to beat just as long and even more vigorously than the hearts of normal rabbits. Now, it has been observed by many clinicians that patients with hyperthyroidism do not develop congestive heart failure until they are past the middle of life. The answer to our question is suggested by this fact.

The heart begins to grow old from the minute it comes into existence. It is endowed with a large reserve capacity which enables it to rise to all normal demands. As time goes on, however, this reserve capacity, like that of all organs, gradually becomes reduced by simple aging. This reduction would naturally be most notable in middle life and old age. In these periods also there is a tendency to the development of coronary sclerosis, which reduces the reserve capacity of the myocardium by causing a reduction of the reserve capacity of blood supply to the heart muscle. Most individuals who develop hypertension do so in middle life, and this is a definite burden upon the heart, more so, in fact, than hyperthyroidism. Infections of all kinds, while rarely causing heart failure, probably leave some impress upon the heart muscle which may reduce its reserve capacity. These several factors, which are most prominent later in life, all tend to make the heart less able to withstand an additional load. Long continued hyperthyroidism, entailing as it does some increase in amount of work done by the heart, and associated in many cases with general malnutrition which itself would depress the cardiac reserve, might be just such an additional load as to use up the small remaining reserve power of the heart in those individuals in whom the above factors were more prominent than usual. Congestive heart failure would then slowly ensue.

In this simple presentation I hope I have demonstrated three things: (1) That it is a coincidence that the heart beats faster and more vigorously in hyperthyroidism, supplying more oxygen to the tissues almost by chance, (2) that while hyperthyroidism is an important cause of heart failure because it can be cured, it is not a common one since the strain upon the heart is not particularly great, and (3) that when heart failure does occur it is in middle life because of the additional factors concerned with the aging process.

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A NEW EARLY DIAGNOSTIC SIGN OF ACUTE APPENDICITIS*

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Statistics of large life insurance companies have recently shown a surprisingly high and increased mortality in acute appendicitis. When one observes clinically at the bedside a case of acute appendicitis he may be frequently puzzled as to the positiveness and accuracy of his diagnosis. Any help, no matter whether it be symptom, sign or agent, is worth considering in reaching the correct diagnosis. A rather interesting objective symptom or sign that I have observed for the past several years early in many acute cases of appendicitis is a definite crepitation which is felt or heard when the hand palpates firmly in the right lower quadrant over the cecum and appendiceal region. The sound is a typical borborygmus or noise which can be heard when flatus is in the bowel. It may not always be present and many times cannot be heard, but frequently the crackling sensation can be detected with the palpating fingers. This crackling, gurgling or crepitation is due to the presence of flatus or gas in the terminal ileum and adjacent cecum. The cecum is fixed and gas accumulates as the result of a local ileus or an adynamic condition or paresis, thus ballooning the cecum. Therefore, when pressure is made upon the head of the cecum from above in the right lower quadrant, the gas is pressed about with the resulting crepitant or crackling sensation.

The reason for this dilatation of the cecum and terminal ileum is evident. It is nature's effort to splint the part; in other words, the appendix is inflamed, and the first step of nature is to put the area or part at rest. This is done by an arrest of the activities or peristaltic waves in this location with a resultant local adynamic ileus. A perityphlitis exists in almost all cases as the basis of acute appendicitis. This same phenomenon may be noticed in any acute inflammation about the head of the cecum, but by far the chief offender in this region is the appendix. This crepitant phenomenon is evident in the early inflammatory period before perforation has occurred and even before definite rigidity of the right rectus muscle is present. When the muscle is contracted to rigidity, the sign is not possible of detection. I have also noticed it and observed it in most cases in which the appendix was found at operation to be retrocecal or adherent.

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* Read at the Annual Meeting of the Society, May 4, 1932.

No claim is made that it is a pathognomonic sign or that it is positive in every case. It is simply an adjunct or a diagnostic help. Everyone is familiar with the classical symptoms or textbook case of appendicitis with nausea, vomiting, pain (at first diffused in character and later localizing in the right lower quadrant), rigidity, tenderness over McBurney's point, slight elevation of temperature, a comparatively slow pulse in the early unruptured cases and leukocytosis. How many cases are seen that do not present the above classical symptoms or show only one or two? It is for these atypical cases that this sign may be a very helpful aid in early diagnosis. A patient may have diffuse pain without localization and also nausea without vomiting, fever or leukocytosis. Palpation over McBurney's point may elicit tenderness, and if at the same time crepitation or borborygmus is detected as the palpating hand examines the right lower quadrant, one may be sure appendicitis exists. It is diagnosis with which one is chiefly concerned in acute appendicitis. If one is able to diagnose these cases soon, namely in the acute early catarrhal or early suppurative stage, then more prompt treatment will follow. The mortality depends upon diagnosis and not treatment in appendicitis. There is little or no question as to treatment. All agree that removal of the offending appendix is the only real cure. The earlier it is removed, the better. It is for this reason that I am stating what I have observed as a rather helpful and diagnostic aid in these early cases of acute appendicitis.

In a series of 300 cases in which record was made of this sign, 65 per cent showed the sign to be positive, that is, a definite crepitus in the right lower quadrant was detected upon palpation. In the remaining 35 per cent of these cases, rigidity had been definitely established, and therefore the sign was impossible of detection. It was also noticed that this sign was present in 90 per cent of all the cases in which at operation the appendix was found to be retrocecal. Abstracts of several cases follow in which the value of the sign was demonstrated:

REPORT OF CASES

Case 1: A child, 5 years of age, had been sick for 2 days with nausea, abdominal pain and some slight distention with a temperature of 102°F. and rapid pulse. Palpation in the right lower quadrant elicited slight tenderness, and definite crepitation was found over the head of the cecum. A diagnosis of appendicitis was made. At operation the appendix was found to be retrocecal.

Case 2: A child, 4 years of age, with similar symptoms, nausea, vomiting, fever of 103°F. and rapid pulse, was sick for 4 days. Abdominal examination showed some tenderness but no rigidity, and tenderness in the back and right lumbar regions. There was a question of the possibility of pyelitis. Examination of the abdomen showed a distinct crepitation or local borborygmus in the right lower quadrant. Immediate operation was advised. A retrocecal, suppurative appendix was found at operation. The patient made a good recovery.

Case 3: A man, aged 33 years, had been ill for 3 days with symptoms of nausea and vomiting. He had been treated for gall bladder trouble. Upon examination definite tenderness was found in the right side of the abdomen, both in the upper and lower quadrants, but particularly in the right lower quadrant. There was little rigidity of the right rectus muscle. There was considerable tenderness in the back. Upon palpation to elicit tenderness, distinct gurgling and crepitation were detected over the cecum. Immediate operation was advised. The appendix at operation was found to be retrocecal with the tip gangrenous, forming a small retrocecal abscess. He made a good recovery.

Case 4: A young woman, aged 20 years, with previous non-essential history became acutely ill with pain in both lower quadrants of the abdomen, and vomiting. The temperature was 100°F. Pelvic examination elicited some tenderness. Both adnexae were palpable in the cul-de-sac. However, there was considerably more tenderness in the right lower quadrant. Slight rigidity existed. Upon palpation over the right lower quadrant definite tenderness was elicited, and it was particularly noticed that definite crepitation existed with a distinct gurgling sensation present. There was a question as to whether acute appendicitis or a pelvic infection existed. In view of the symptoms, particularly the tenderness and definite crepitation and local borborygmus in the right lower quadrant, a diagnosis of acute appendicitis was made. At the operation the appendix was found to be gangrenous and adherent in the pelvis and attached to the fimbria of the right Fallopian tube.

Case 5: A woman, aged 37 years, had had a fibroid tumor of the uterus for the past several years with some metrorrhagia; otherwise her history was without incident. She became suddenly ill with pain in both lower quadrants of the abdomen and nausea but no vomiting. Examination showed a temperature of 100.4°F., pulse 88, respiration 24. The abdominal tumor was distinctly palpable and was about the size of a grapefruit. Palpation in the right lower quadrant showed definite tenderness and only slight rigidity of the rectus, but the distinct crepitant sensation was present. A diagnosis of appendicitis was made. At operation, a suppurative appendix was found which was unruptured. The patient made a good recovery.

CONCLUSIONS

1. A definite gurgling, crackling or crepitant sensation or local borborygmus can be detected upon palpation in the right lower quadrant of the abdomen in any inflammatory condition about the head of the cecum, particularly acute appendicitis.
2. This sign appears early and must be found before definite rigidity of the right rectus muscle occurs.
3. It is almost constant in the retrocecal or adherent types of acute appendicitis.
4. It is of great aid and most valuable in the diagnosis of the atypical case and especially in acute appendicitis in childhood and young adults.

RIEDEL'S THYROIDITIS*

REPORT OF A CASE

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In 1896 Riedel described a condition of the thyroid gland which generally bears his name. In his original paper he states, "A somewhat similar process in the thyroid will now be described. In 1883 I operated on a man of 42 years who had noted an increase in the size of his thyroid for the past six months, associated with considerable thyroid distress. A bilateral tumor was found not very large, but extremely hard and immovable. I assumed it to be a malignant goiter and on Nov. 30, 1883, attempted an operation. The tumor was exposed and it was immediately evident that it was densely adherent on both sides to the carotid artery and the internal jugular vein. A portion of the latter was resected after removal of a piece of the tumor about the size of a walnut, the operation was concluded, as I deemed it inoperable. . . . After six months he declared he felt perfectly well and able to work. In the meantime he had been examined and we found no trace of a neoplasm. We had plainly to deal with an inflammatory process: infiltration with round cells had been demonstrated. . . . I waited six years before reporting this case." These paragraphs, written by Riedel in 1896, are almost identical with reports of cases in the last three years.

Riedel's disease is variously known as woody thyroiditis, primary chronic canceriform inflammation, primary chronic inflammation, ligneous thyroiditis, fibrous degeneration, struma lymphomatosa, benign granuloma and chronic productive thyroiditis. Almost every clinician and pathologist has been impressed either by the hardness of the gland or the fibrous tissue present upon section, and consequently the various names have something in common and in a general way are appropriate. I prefer to call the condition chronic proliferative thyroiditis. All cases reported up to 1931, including my own, number 43. The following symptoms and signs represent a fair cross-section of the group.

The entire process is not rapid, but a month or two is sufficient to stamp it as a distinct recognizable tumor or growth. It is more frequent in the female than in the male, and the large majority occur between the ages of 30 and 50 years. The patient seeks relief not from the tumor, but from the sense of discomfort about the neck, dysphagia, a dry cough, nervousness and sometimes even dyspnea. The general clinical examination is not noteworthy. The pulse is not accelerated and the B. M. R. is probably not increased. The examination of the neck, however, tells the story.

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* Read before the Society March 23, 1932.

The uniform enlargement of one or both lobes, smooth, resistant and fixed like a setting in a ring, is almost pathognomonic. The skin is freely movable over it. Palpation of the thyroid conveys the impression that it is fused with the muscles which cover it and the structures in which it is imbedded; were it nodular, the diagnosis of malignancy would be the only rational one. The lymph glands are not enlarged, and the x-ray does not show the thyroid extending below the clavicle. In the only case in which the B. M. R. was noted, it was plus 34. Tremor, fatigue and other usual signs of exophthalmic goiter are not present. Hoarseness of voice, tightness about the neck and soreness of the throat are symptoms associated with the disease. The general symptoms are moderate loss of weight, sense of ill health, apprehension, restlessness and inability to concentrate. The loosely used word "neurasthenia" seems to be the usual designation of these symptoms.

Many of the observers diagnosed their cases as carcinoma of the thyroid, and in a few instances the same diagnosis was made even after a microscopic examination. In all but one of the reported cases an operation was done, with five postoperative deaths and four remote deaths mentioned. The one case not operated upon was reported by Balfour. When first seen it was deemed malignant and inoperable, but seven years later the patient was in good health, having experienced a spontaneous cure. The cases reported do not show a follow-up for a period of years, but after the lapse of several months, in most instances, good health without recurrence was noted.

After establishment of the diagnosis by biopsy further operative procedure would depend largely upon the degree of dyspnea. The histories of the cases reported give one the impression that often relief was urgent and that emancipation of the trachea or even tracheotomy was required. A bilateral partial lobectomy is not the ideal operation. The disease seems to be somewhat self-limited, and if the patient escapes stenosis of the trachea spontaneous recovery may follow. It is interesting to speculate on the value of radiation as a method of treatment, either in the form of x-ray, radium, or radium emanations. Such treatment has not been reported, probably for the very good reason that the diagnosis has not been made prior to operation. More general knowledge of Riedel's thyroiditis will doubtless result in the recognition of a considerable number of cases in which, it is hoped, an early diagnosis will be made and more rational treatment developed.

Report of Case

Mrs. M. W., 44 years of age, a clerk, first consulted me March 30, 1931, for loss of weight, nervousness, soreness of the throat, fatigue, dry cough, and a visible swelling of the neck in the region of the thyroid gland. The family history is devoid of any interesting or important medical data. The patient's general health had been good, although she had measles, mumps, chicken-pox and typhoid fever. She had had only one pregnancy, a miscarriage. The present illness began so gradually that no date could be fixed for its onset. She had lost 16 pounds in 2 months, and had become so nervous that she was less efficient in her work. She complained bitterly of sore throat, dry cough and difficulty in swallowing. The oto-laryngologist noted only a small tag of tonsillar tissue in the right tonsillar fossa. The vocal cords had perfect motility. A suspicious (presumably diseased) first molar tooth was reported. Physical examination revealed the heart not to be enlarged and without murmurs. The blood pressure was 124 systolic and 70 diastolic. Showers of fine râles were heard in both apices of the lungs. The thyroid gland was moderately enlarged bilaterally, unusually hard, smooth and almost fixed in its position. The skin was freely movable over the gland. Exophthalmos was not present, nor any of the distinctive signs of Basedow's disease. The pulse was 88, weight 115 pounds, B. M. R. plus 16. X-ray examination of the chest disclosed the lungs, heart and aorta apparently normal. The diagnosis of Riedel's thyroiditis was made. On April 7, 1931, under avertin and ethylene anesthesia, the thyroid was exposed. Both lobes were moderately enlarged, but unusually hard, smooth and fixed. Delivery of either lobe was impossible because the tissues surrounding the gland seemed to be denser and much more adherent than usual. A natural line of cleavage could not be found. It appeared as though the muscles and areolar tissue in this region were involved in the same process that had invaded the gland. An elliptical section was taken out of each lobe, and the resistance to cutting was striking. The patient's recovery was without incident and she left the hospital in 8 days. She remains well. The sections of the gland were sent to Dr. O. B. Hunter for complete examination, and his report states: "Sections from this tissue show a marked proliferation of the interstitial connective tissue of the gland, producing rather large and irregular fibrous tissue trabeculae and in some instances almost completely obliterating the histological architecture of the organ. There is also a well defined, diffuse, patchy round cell infiltration, together with some endothelial proliferation, and in some areas the entire thyroid structure has disappeared, giving rise to rather dense, hard fibrous tissue. In other areas tiny islets of the acini remain, containing in some instances a small amount of thyroid substance, while in others the thyroid substance has disappeared. In still other areas the thyroid substance is considerably more prominent. The chief and colloid cells have, to a large extent, disappeared, and the thyroid substance is surrounded by numerous foreign body giant cells, giving a rather peculiar and bizarre appearance. The condition is chronic proliferative thyroiditis, known as Riedel's struma."

SUMMARY

The woody thyroiditis of Riedel was described in 1896, and a total of 43 cases has been reported. The etiology is unknown, but it can be stated that it bears no relation to tuberculosis or syphilis, and no infectious micro-organisms have been demonstrated. The pathology is constant, and is characterized by a large amount of fibrous tissue replacing the normal thyroid substance with giant cells frequently seen.*

It is not associated with hyperthyroidism or exophthalmos. Insufficient data concerning the basal metabolic rate have been obtainable to warrant any statement regarding it, but from the symptoms described one would assume that the B. M. R. is not greatly altered and if anything should be depressed.

The clinical diagnosis of carcinoma of the thyroid is the commonest error and an excusable one; the chief difference is the nodular hardness in carcinoma and the smooth density of Riedel's struma.

Surgical treatment should be directed only to the relief of pressure. In the five postoperative deaths recorded, two were from carotid hemorrhage. Every case but one was operated upon. Spontaneous cures were probably more frequent than the literature indicates.

A new case of this rare and mysterious disease is reported.

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* Broders of the Mayo Clinic (in a personal communication) considers it an inflammatory process and does not believe it ever becomes malignant.

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DISCUSSION

Dr. Thomas A. Groover: I reported a case of this type some years ago. The patient was about 50 years of age, and was referred to me by Dr. James F. Mitchell, diagnosed as inoperable carcinoma of the thyroid. When I saw the patient first I fully concurred in the diagnosis and gave her x-ray treatment. In a month the tumor had entirely disappeared and its rapid response to treatment led me to doubt the original diagnosis, and further investigation convinced me that it was typical Riedel's struma. Lack of familiarity with this disease accounts for most of the failures to make a correct diagnosis. Superficially it resembles cancer, but the history, symptomatology and particularly the physical characteristics serve to differentiate it. The extreme hardness and the impression one gets that all of the tissues at the front of the neck are fused into a solid mass are unlike any other disease of the thyroid. As might be expected surgical removal of the mass is a dangerous undertaking. Roentgentherapy is worth trying.

Further discussion was participated in by **Dr. George Tully Vaughan.**

PERFORATION OF DUODENAL ULCER FOLLOWING IMMODERATE DRINKING OF ALCOHOL

REPORT OF THREE CASES*

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(*Formerly of Panama City*)

Probably most cases of perforation of duodenal ulcer seen in large cities are encountered in emergency rooms of dispensaries and hospitals and simulate acute appendicitis or other acute abdominal disturbances. The three cases to be reported here were seen under such circumstances. Two of the patients gave no history suggestive of ulcer. All gave frank statements of recent alcoholic intoxication. The latter fact led me to believe that these ulcers might have been either caused by or at least the perforation induced by the drinking. All three cases were seen within twenty-three days. The first patient was admitted to the hospital October 23, 1931; the second, October 27, and the third, November 15. All the patients were young men. Besides partial duodenectomy (Judd type), posterior gastrojejunostomy was done in each of the cases, because of the danger of peristaltic disturbances, bleeding, and obstruction.

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* Read at the Annual Meeting of the Society, May 4, 1932.

REPORT OF CASES

Case 1. A man, aged 33 years, was admitted to New Casualty Hospital at 9:30 p.m., October 22, 1931, with cramp-like pains in the epigastrium. These paroxysmal attacks had begun while he was riding in a motor car. Symptomatic treatment was given and the patient advised to remain for observation, but he refused.

He returned in the morning of October 23, and at that time the pains were more extensive and were sharp in character, the abdomen was rigid, and he was vomiting. He then gave the history that during the past 5 years he had suffered from excruciating pain in the epigastrium two hours after meals. These pains had been relieved by ingestion of food and alkalies. He had been a heavy drinker. March 5, 1930, he had been admitted to Gallinger Hospital, suffering from abdominal pains of 4 days' duration, definitely localized to the right lower abdominal quadrant. Appendectomy had been performed through a McBurney incision, but symptoms had not been relieved, and loss of weight and much trouble with "indigestion" had continued. He was fairly well developed. There was marked tenderness and board-like rigidity over the epigastrium. Leukocytes numbered 10,000 in each cubic millimeter of blood. The concentration of hemoglobin was 80 per cent. The pulse rate was 90, the respiratory rate 20, and the temperature was 99°F. Administration of opiates failed to relieve the patient's distress. Emergency operation for perforated peptic ulcer was performed. Under ether anesthesia a large, upper right rectus incision was made. There was some yellowish fluid in the abdominal cavity. The peritoneum was markedly inflamed. Further exploration revealed, about 3 cm. below the pyloric sphincter, a perforation of the anterior wall of the duodenum, about 2 cm. in diameter. The stomach was somewhat dilated and the duodenum inflamed and movable. The operation already mentioned was performed. Two Penrose drains were introduced in the upper part of the wound. Convalescence was without incident. The patient remained entirely free of symptoms, and was dismissed from the hospital on the eighteenth post-operative day, able to take soft food without discomfort.

On examination of the excised tissue, Dr. Tomas Cajigas made a diagnosis of perforated duodenal ulcer, showing marked attempt at repair and acute inflammatory changes. The duodenal mucosa outside the ulcer proper was intact. The margins were abrupt. A considerable excavation extended down through the muscular coats and most of the bottom of the ulcer was of subperitoneal connective tissues, which were greatly thickened by a large mass of granulation tissue. The bottom of the ulcer was covered by necrotic tissue infiltrated with pus cells. The peritoneum adjacent to the ulcer also was the site of acute inflammatory reaction. Masses of bacteria of moderate size were present throughout the inflammatory area. There was no evidence of malignancy.

Case 2. A man, aged 19 years, became sick very suddenly at 8 a.m., October 27, 1931, and was brought to New Casualty Dispensary where he was admitted to the surgical service. He complained of acute, cramp-like pains all over his abdomen, which had started that same morning, and had been followed by nausea and vomiting. For 10 days he had been drinking heavily of some kind of intoxicating liquor. He had enjoyed good health all his life, and never had any gastric disturbances. He was fairly well nourished. His entire abdomen was rigid and very tender, and he was vomiting frequently large amounts of clear fluid and was "screaming with pain." The urine was negative. Leukocytes numbered 14,000 in each cubic millimeter of blood. The pulse rate was 92, and the respiratory rate 22. The temperature was 98.4°F. That same morning under ether anesthesia a low right rectus incision was made, and on opening the peritoneum a large amount of dark bloody fluid came into view. The cecum was examined and the appendix removed without difficulty. Sufficient pathologic change was not observed in these organs to explain the condition. The incision was therefore widened. A small hard mass was then palpated in the duodenum. A perforated ulcer was found on the anterior surface of the duodenum, about 1 cm. below the pyloric sphincter. Excision was done, followed by posterior gastrojejunostomy, as in case 1. Recovery was uneventful. The patient continued to be free of gastric symptoms and left the hospital November 21. Dr. Cajigas, who examined the removed tissue, made a diagnosis of perforated duodenal ulcer which showed a moderate attempt at repair, and acute peritonitis about the appendix. The duodenal mucosa had been completely destroyed and all intestinal coats lost. The subperitoneal connective tissues formed the bottom of the ulcer, where there was a moderate amount of mature granulation tissue, through which the perforations took place. No appreciable acute inflammatory change was apparent. At some points there were focal accumulations of lymphoid and plasma cells. There was no evidence of malignancy.

Case 3. A man, aged 26 years, became very ill the morning of November 11, 1931, with acute abdominal pain and vomiting. On his admission to New Casualty Hospital, his complaint was of acute, sharp, lancinating pain in the abdomen, not localized, and he vomited a large amount of dark, greenish fluid. He had not had previous digestive disturbance, and he had been feeling well until the morning of his admission. His appetite was poor, but he attributed this to worry and heavy drinking for four weeks. His bowels had been regular, and he had not noticed loss of weight. He was fairly well nourished, his abdomen was somewhat rigid, and he was complaining constantly of nausea and vomiting. The urine was negative. Leukocytes numbered 19,000 in each cubic millimeter of blood. The pulse rate was 90 and the respiratory rate 32. The temperature was 100°F. A diagnosis of acute appendicitis was made. At 7 p.m. that evening, under ether anesthesia, a low right rectus incision was made, and on opening the peritoneum a large amount of greenish fluid came into view. On exploration the cecum was found normal, and the appendix was easily removed, but it, apparently, was normal. As in case 2, the wound was enlarged, and manual palpation of the duodenum gave evidence of a perforated duodenal ulcer, about 1 cm. from the pyloric sphincter. The surgical procedure was the same as that employed in case 2. The patient recovered without incident, remained without symptoms, and was dismissed from the hospital December 7. After examination of the removed tissue Dr. Cajigas made a diagnosis of ruptured duodenal ulcer, showing mild, acute inflammatory changes. Outside the ulcer the duodenal mucous membrane was normal and contained large numbers of Brunner's glands. Along the edges of the ulcerated area there was very little necrotic tissue. There was a small amount of inflammatory exudate, containing large numbers of pus cells. A moderate amount of inflammatory exudate was found on the peritoneum adjacent to the perforation. There was no evidence of malignancy.

Summary

Three cases of perforated duodenal ulcer in young men, all seen within twenty-three days, are reported. In only one of the cases was there a history of previous digestive symptoms. The removed tissues in this case indicated that the condition was chronic. Pathologic changes in the other two cases were evidently more recent and in one of them, definitely acute. A common factor was that each of the three patients had used alcoholic beverages immoderately. The patient whose ulcer was chronic was an habitual heavy drinker; the other two patients had been drinking heavily for ten days to four weeks immediately before the perforation took place. It is suggested that alcohol or the present-day undrinkable beverage may have precipitated the accident in all three cases.

TREATMENT OF THE COMMONER DISEASES OF THE FOOT*

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As far as the writer is aware, a thesis based solely upon the diseases peculiar to the foot has never been presented to this Society. This may have been due to the multiplicity of the diseases peculiar to these anatomical members or to the fact that one does not desire to limit his discussion to such a small and "insignificant" member as the foot.

The literature on this subject is extremely scanty, and there is hardly a textbook which can be consulted with any great degree of satisfaction because of a great deal of irrelevant and academic material. The subject is prosaic and the mere mention of the "foot" seldom arouses much interest unless one happens to be an orthopedist or a sufferer.

Historically, foot affections were recognized and treated by the ancients. Marathon runners were known to prepare for the strain thrown upon the foot during the long races by the application of leather thongs over the dorsum of the foot and under the arch. Individuals suffering from congenital deformities were looked upon as creatures of the devil, and were often attached to the court as omens of good luck.

An arbitrary classification of the diseases of the foot may appear presumptuous, yet one seems imperative even for the sake of brevity.

The subject is best divided into the following types: (a) Congenital deformities or defects; (b) acquired deformities (static disturbances); (c) traumatic sequelae and diseases.

Clubfoot

Among the congenital deformities the most dramatic and outstanding disturbance of the anatomical conformation of the foot is that commonly classified as clubfoot. Formerly talipes was considered synonymous with the term clubfoot, and under this generic term were grouped the various distortions, but now it is used as a descriptive prefix for the titles of deformities. Roughly, there are four simple and four compound varieties. The deformity in the majority of cases results from a developmental defect in that the foot fails to unfold before birth and remains distorted. A description of the various deformities would be merely academic; the all important thing is the prompt correction of the distortion, the sooner after birth the better. The treatment should be instituted with the idea in mind that the deformed foot is capable of regaining perfect form and function. This is often possible provided the abnormality is not the result of defective anatomical formation of the foot or the result of paralysis commonly found associated with forms of spina bifida or of congenital defects of the nervous system, such as is seen in Little's disease and Friedreich's ataxia. Treatment consists in correcting the deformity by untwisting and maintaining the foot in a correct anatomical position by means of a plaster cast. The cast should be worn for months with adjustments made at regular intervals. Care should be exercised in cases of talipes varus that the associated condition of inward rotation of the tibia be corrected at the same time. This is best accomplished by creating a fulcrum of the flexed thigh. Operative treatment is rarely required except in persistent deformities and in those cases complicated by anatomical defects in the structure of the foot. In general the treatment then consists in removing a wedge of bone, lengthening the tendon of Achilles, and separating the deltoid ligament. Nowadays one rarely sees clubfoot in an adolescent, because early treatment of this condition has become universal; clubfoot in an adult is now almost a curiosity.

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* Read before the Society March 23, 1932.

Congenital Clawfoot

Of equal clinical importance with clubfoot is the congenital defect commonly referred to as clawfoot or pes cavus. The deformity may not be manifested until the infant begins to place its weight on the feet when learning to walk. The condition may be unilateral or bilateral. When it is solely a congenital defect, treatment offers a reasonable assurance of a useful foot. However, before any treatment is begun or corrective measures instituted, a thorough examination should be made to exclude diseases of the central nervous system. Treatment in the early stages consists in correcting the arch by the application of a plaster cast. Subsequently, if the deformity is not corrected, operative procedure may be instituted; this consists in a plastic osteotomy, with loosening first the superficial and deep plantar fascia, removal of a wedge of bone, flattening out the foot and placing it in a true anatomical position by means of a cast. It is important that the tendon of Achilles be not disturbed, since it acts as a fulcrum against the leverage of the foot.

Hammer Toe

Congenital hammer toes may be unilateral or bilateral and rarely require surgical intervention during the early period of development of the individual. An operation to lengthen the extensor longus and brevis tendons is required. Various operations, having for their purpose the lengthening of the extensor tendons are resorted to, but it seems to be the consensus of opinion that a complete tenotomy offers the best results, and in extreme cases excision of the metatarsal heads may be necessary.

Flatfoot

Congenital pes planus, or flatfoot, is generally due to inherited laxity of the ligaments of the feet. The treatment, therefore, does not differ materially from that required for the acquired conditions manifested during the later period of life. Pes planus, or flatfoot, is among the most common of the acquired deformities. For a clear picture of the mechanism of the symptoms and resulting condition of the foot, one may recall that the architecture of the foot presents a unit composed of a number of blocks and arches, so arranged that their proper inter-relationship creates a mosaic pattern resulting in a symmetrical member. When this architectural scheme is distorted either by weakness of the muscles, wearing of improper shoes, or disease, pes planus results. There are several degrees of severity of flatfoot and the condition may also be classified as flaccid and rigid flatfoot. The predisposing cause is that of weakness and superimposed fatigue caused by excessive strain and passive attitudes.

The shoe as a factor in the production of flatfoot is universally recognized. The modern shoe thrusts the big toe outward, thereby displacing the main abuttment of the longitudinal arch at the forward and inner point, allowing the foot to roll inward with consequent distortion of the weight-bearing line which is normally through the base of the second toe.

The first symptom is that of strain of the foot, manifested by burning, sweating, pain, stiffness, and in more aggravated types, swelling, circulatory disturbances and deformity and lowering of the arch. Cramps and other symptoms referred to the calves and even to the lower region of the spine are not uncommon. Pain in the back, various types of pain in the legs, sciatica and anomalies of the hips may be remote symptoms of flatfoot; they are due to the attempt of the musculature to correct the distorted pull resulting from a misplaced transference of the foot balance.

The ideal attainment in treatment is restoration of a useful arch and removal of pressure symptoms. The complete flatfoot is more often painless than that resulting from acute strain. The first indication is to make passive motion free and painless to the normal limit. The arch must be supported until relief may be accomplished by plates and strapping. I generally overcorrect the foot and maintain this position by strapping and the use of felt pads. In all cases it is necessary to fit the patient with a proper shoe. This shoe is one that will allow sufficient space for the independent movement of the toes and especially one that does not thrust the big toe outward. The inner border of the sole and heel should be elevated to such a degree as to cause the patient to "toe inward." Adjunct treatment consists in physiotherapy to increase the vasomotor and myostatic functions of the foot.

Operative measures may be desirable to correct unsightly members or to relieve persistent pain. The most common surgical procedure is the removal of a section of bone from the scaphoid on the inner side of the foot and insertion of the segment into a fissure created in the neck of the os calcis on the outer side of the foot. Recently Miller has advocated the elevation of a flap of ligament and bone from the inner side of the foot, and removal of a section from each of three articulations. The arch is moulded, the flap replaced and the foot mobilized in a plaster cast.

Acquired Clawfoot

Acquired clawfoot or pes cavus may be the result of the use of improper shoes, especially ones with high heels, but more commonly it is the result of poliomyelitis, often not recognized, or of alcoholic neuritis. Besides the deformity of the foot and the mechanical interference with function, its most common symptom is pain in the dorsum of the arch and resulting bursitis. The gait is disturbed and trophic ulcers are common.

Treatment of the milder cases is methodical stretching, either by active methods or the use of specially constructed shoes. Operative treatment to correct the deformities involves stretching the tendon of Achilles and in the more resistant cases division of the plantar fascia and removal of a bony wedge and arthrodesis of the midtarsal joint. In the rigid cases subastragaloid arthrodesis may have to be resorted to.

Hallux Valgus

Hallux valgus is a static disturbance usually accompanying pronation of the feet or resulting from the wearing of a short shoe or ill-fitting stocking. The condition is frequently complicated by an inflamed bursa, or "bunion." Locomotion is painful and awkward. The deformity and pain are generally the causes of the patient's seeking treatment. Relief is offered in the early cases by a roomy shoe with a straight, inside weight-bearing line. In moderately severe types it may be necessary to excise the bursa and its underlying bony spur. The radical operation, practiced in severe deformities accompanied by arthritis and stiffness of the joint, consists in a wedge osteotomy of the neck of the metatarsal bone and a release of the capsule of the joint on the opposite or median side.

Fractures

The common fracture of the foot is that involving the shafts of the metatarsals, which may be the result of prolonged hiking, mountain climbing, or jumping and landing on the toes. Fracture of the fifth metatarsal without displacement is frequently unrecognized and may lead to pain and swelling along the outer border of the foot.

Fracture of the os calcis is usually not recognized until secondary symptoms appear and a thorough examination of the foot is made. The failure of early diagnosis is generally due to the fact that flexion and extension of the ankle joint is not necessarily interferred with. The common cause is a fall from a height, the individual landing upon the heel. Swelling, where formerly there was none, and thickening appear on both sides of the foot beneath the malleoli, and the heel appears short. The subastragaloid joint is deranged, with impairment or loss of abduction and adduction of the foot. The X-ray appearances render the diagnosis clear. Operative treatment consists of an arthrodesis of the astragalus to the os calcis and offers the only successful results of this type of fracture in the majority of cases.

Minor Conditions

Supernumerary bones are of historical interest because they are frequently mistaken in X-ray plates for small fragments broken from adjacent bones, particularly when they are unilateral.

Among the more common diseases of the foot are parasitic infections, osteogenic processes, bursitis, circulatory disturbances, Kähler's disease of the scaphoid, and various benign growths. While it is impossible to discuss minutely the minor diseases of the foot, such as corns or callouses, I feel that a strong plea to the medical profession must be made at this time to check the invasion of charlatans and quacks who are certainly practicing minor surgery of the foot.

A recent article in a lay magazine alleges that the medical profession in its aloofness has allowed the non-medical man to usurp the management of this important branch of medicine. This indictment is well grounded, and one may mention in support of it the performance of minor operations by chiropodists and podiatrists, and their treatment of painful feet by physiotherapy and arch supports, without basic knowledge of the underlying pathology. Their present activities and their relation to the public are somewhat similar to those of the optometrist. We are all conversant with many systemic diseases in which failing vision is the first symptom noted. However, glasses are often fitted without any attempt being made to determine the underlying disease. The chiropodist may likewise be criticized. An opportunity to observe initial vascular changes in the extremities, or to recognize a latent diabetes mellitus and other systemic disturbances is frequently denied the physician until the disease is far advanced and beyond relief because the chiropodist may have treated the local disturbance without medical aid. Minor surgery of the foot is brother to major surgery of the same member and should be reared within the same household under proper paternal care.

MORTALITY IN APPENDICITIS*

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In 1886, Fitz first clearly recognized appendicitis as a disease entity and today, only 46 years later, appendicitis ranks well up with the acute diseases in the mortality exacted from it each year. Furthermore, the mortality rate is increasing each year. Here are some of the salient features brought out in a statistical study of appendicitis.

1. Table I. The rate per 100,000 in the United States has increased from 12.2 in 1910 to 15.2 in 1929.
2. Table I. It is a disease of young people and the average age of death from appendicitis in 1920 was 32.4 years.
3. Table II. The United States leads the list of all countries with the highest death rate in appendicitis.
4. Table III. There is a wide variation in the death rate in various cities in the United

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* Read at the Annual Meeting of the Society, May 4, 1932.

States. This variation cannot be attributed to climate, soil, food, habits or water, as there is no geographical distribution. Neighboring cities in many instances have a wide variation in the death rate. The mortality rate per 100,000 is higher in the city than in the country, but one must bear in mind that usually the patient from the country with appendicitis is brought to the city for treatment.

5. That there is a greater incidence of appendicitis cannot be shown by a study of the mortality rate itself, but this is a very obvious fact. With the wide variation in the mortality rate which exists in different parts of the globe there is bound to be a wide variation in the incidence of the disease in various countries. Unfortunately for such a study, appendicitis is not a reportable disease, hence no figures as to the exact number of cases are available.

TABLE I

Mortality Rates per 100,000

	1910	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	AVERAGE AGE AT DEATH (1920)
Appendicitis and typhilitis	12.2	13.4	14.4	14.1	14.7	14.8	15.2	15.0	15.0	15.3	15.2	32.4
Hernia and intestinal obstruction	12.2	10.6	10.7	10.5	10.4	10.5	10.8	11.2	10.5	10.5	10.6	
Cancer and other malignant disease	63.0	83.2	85.6	86.2	88.7	91.1	92.8	95.1	95.7	96.1	95.9	60.7
Diseases of the heart	132.1	159.1	156.3	164.6	173.8	176.5	185.7	199.5	196.0	208.2	210.8	64.7
Cerebral hemorrhage and softening	71.5	91.9	81.0	82.9	87.0	88.9	81.0	92.8	90.3	93.4	92.1	
Acute and chronic nephritis	89.0	89.2	85.0	87.9	89.3	88.8	96.5	98.5	92.6	95.2	91.2	62.2
Influenza and pneumonia	181.5	153.4	60.1	87.7	105.1	76.1	94.7	99.5	69.4	103.9	109.6	
Pulmonary tuberculosis	181.8	100.6	87.2	85.7	82.8	79.5	77.2	78.0	72.6	71.5	69.0	36.8
Other forms of tuberculosis	20.1	13.4	11.7	10.6	10.0	10.1	9.5	9.3	8.4	7.8	7.0	
Puerperal septicemia	5.7	6.6	6.8	5.7	5.8	5.7	5.5	5.3	5.3	5.0	5.0	
Other puerperal causes	7.6	12.5	10.1	9.9	9.7	9.6	9.3	9.1	8.5	8.8	8.2	
Diabetes mellitus	9.7	16.0	16.8	18.3	17.7	16.4	16.9	18.0	17.5	19.0	18.8	
Typhoid and para-typhoid	35.9	7.8	9.0	7.4	6.8	6.7	8.0	6.5	5.5	4.9	4.2	
Diphtheria	43.3	15.8	17.6	14.6	12.0	9.3	7.8	7.5	7.8	7.2	6.6	
Smallpox	1.9	0.6	0.7	0.7	0.1	0.9	0.7	0.4	0.1	0.1	0.1	

The treatment of any disease with a mortality rate which is high and which is increasing from year to year is subject to scrutiny and careful study. Certainly other factors besides the treatment enter into the difference in mortality between the different countries and perhaps between the different cities in the United States.

This subject of mortality in appendicitis has been given due attention by the Life Insurance Companies, and some interesting articles have been written in the past several years by men interested in the problem from this viewpoint. Hoffman has recently written a comprehensive article and in it he says, "Something is radically wrong with our appendicitis record and there is the utmost urgency for a strictly scientific study of the whole question." As usual the entire problem is thrown back upon the medical profession and part of the increase in the mortality is attributed to the treatment of the disease afforded it in this country.

Any study of this question must recognize three distinct factors, and three distinct questions must be answered.

1. Is there any increase in the incidence of appendicitis, and is the incidence greater in the United States than in other countries?
2. Is there an increase in the virulence of the disease and a difference in the virulence as it occurs in different countries?
3. Is the treatment of the patient suffering with appendicitis adequate and is it as

good in the United States as in other countries with a lower mortality?

As regards the first two questions it is not the purpose of this paper to attempt to answer them or discuss them. Suffice it to say in this connection that there is no question but that appendicitis is on the increase in the United States and that the incidence per 100,000 is greater in this country than in the other countries with a lower mortality, such as Siam, Italy, etc. Why this is true is hard to explain. As regards the virulence of the infection, nothing in a statistical way can be said. That there is a difference both in virulence and in the pathological picture in different cases of appendicitis is a fact well recognized by every surgeon. For instance, there is the obliterative type of inflammation involving the appendix, going on rapidly to gangrene but remaining a localized process. Then there is the embolic type of involvement of the appendix which very often is a systemic infection with the inflammation in the appendix only one part of the generalized infection, and in this type the virulence is high and the mortality much greater than in the other type.

TABLE II

Deaths from Appendicitis

	Year 1929, per 100,000
Siam	0.2
Ceylon	0.9
Cairo	3.1
Japan	3.7
Iceland	6.0
Italy	3.7
Northern Ireland	5.2
England and Wales	7.1
Germany	9.0
Scotland	10.0
Canada	14.6
United States	15.2

In attempting to discuss the third question, namely, the part that the treatment of the patient with appendicitis plays in this entire question of mortality, the writer's idea was to attempt to show the difference, if any, in the mortality after the operation for appendicitis performed in different stages of the disease. The classification of (1) acute appendicitis but unruptured, (2) acute appendicitis ruptured with peritonitis, (3) subacute appendicitis and chronic appendicitis, as made and the number of operations performed in 1930 with the mortality in these various groups was obtained from practically all the hospitals in Washington. The same statistics in the same grouping are obtained from several large general hospitals in other cities, and finally the same statistics of men engaged in private practice. Unfortunately, insufficient replies to the questionnaire in this latter group were received to make this group of any value.

TABLE III

Cities of United States

	Mortality in 1930 per 100,000
Oak Hill, Ill.	59.0
Lexington, Ky	58.9
Savannah, Ga	40.0
Memphis, Tenn	35.7
Salt Lake City, Utah	35.6
Davenport, Iowa	34.5
Pittsfield, Mass	30.1
Fresno, Calif	1.9
Akron, Ohio	3.5
Newton, Mass	4.6
Elizabeth, N. J	5.2
Washington, D. C	20.1
Chicago, Ill	18.2
Detroit, Mich	18.7
Baltimore, Maryland	18.2
Philadelphia, Pa	14.4
New York, N. Y	15.9
Los Angeles, Calif	15.7

Early diagnosis and well executed operation are the two most important points in the treatment of appendicitis. The first problem in most cases belongs to the medical man, internist or family doctor, and the latter to the surgeon. As a study of Tables V, VI, I and III shows, if early operation is done—that is, before gangrene, perforation or peritonitis occurs—the mortality is so low that it is negligible. In the early cases the operation is the simplest of surgical procedures and even in the large hospitals, where the bulk of the operations is done by the resident staff, the mortality is extremely low. Unfortunately, however, for both the patient and the

TABLE IV

Hospitals in Washington, D. C., Year 1930

	I	II	III	IV	V	VI	VII	VIII	IX	X	TOTAL
Acute appendicitis unruptured:											
Number of cases	319	68	182	309	10	48	115	52	49	41	1,193
Deaths	10	1	3	4	0	0	1	0	0	0	19
Mortality, per cent	3.1	1.4	1.6	1.3	0	0	0.8	0	0	0	1.59
Acute appendicitis ruptured:											
Number of cases	16	15	8	47	3	15	44	10	20	4	182
Deaths	4	2	1	6	2	2	7	1	7	2	34
Mortality, per cent	25.0	13.3	12.5	12.7	66.6	13.3	15.9	10.0	35.0	50.0	18.7
Subacute appendicitis:											
Number of cases	98	58	41	66	17	50	60	21	4	7	422
Deaths	0	2	0	0	0	0	0	0	0	0	2
Mortality, per cent	0	3.4	0	0	0	0	0	0	0	0	0.4
Chronic appendicitis:											
Number of cases	115	28	145	312	16	78	203	68	8	27	1,000
Deaths	0	1	0	3	0	0	0	0	0	0	4
Mortality, per cent	0	3.5	0	0.9	0	0	0	0	0	0	0.4
Total number of cases	548	169	376	734	46	191	422	151	81	79	2,797
Total number of deaths	14	6	4	13	2	2	8	1	7	2	59
Mortality, per cent	2.5	3.5	1.6	1.7	4.3	1.05	1.8	0.66	8.6	2.5	2.1

Total number of cases excluding ruptured appendicitis, 2,615. Deaths, 25. Mortality, 0.95 per cent.

TABLE V

Representative Hospitals in United States and Canada, Year 1930

	HOSPITAL I	HOSPITAL II	HOSPITAL III	HOSPITAL IV	TOTAL NOT INCLUDING III
Acute appendicitis unruptured:					
Number of cases	1,441	2,241	273	116	3,798
Deaths	12	15	27	2	29
Mortality, per cent	0.9	0.66	9.9	1.7	0.76
Acute appendicitis ruptured:					
Number of cases	290	889	Division of cases not listed	47	1,226
Deaths	22	104		2	128
Mortality, per cent	7.6	11.7		4.2	10.4
Subacute appendicitis:					
Number of cases	358	656		17	1,031
Deaths	0	0		0	0
Mortality, per cent	0	0		0	0
Chronic appendicitis:					
Number of cases	1,182	2,504		21	3,707
Deaths	0	5		0	5
Mortality, per cent	0	0.2		0	0.13
Total number of cases	3,271	6,290		201	9,762
Total number of deaths	34	124		4	162
Mortality, per cent	1.03	1.9		2.0	1.6

Total number of cases excluding ruptured appendicitis, 8,536. Deaths, 34. Mortality, 0.39 per cent.

surgeon, the patient very often is not operated upon until perforation and peritonitis have developed, and then the surgical problem of proper treatment is one well worthy of the best surgeon's careful thought and technic, and upon which the outcome of the case very often depends. The time interval from the onset of the attack to the time of operation and the medication given in this time interval are most important. Complete rest of the intestinal tract, which is the proper treatment in this time interval, is not carried out, but just the opposite is done, cathartics and food being often given.

TABLE VI

PRIVATE PRACTICE

	DR. ——	DR. ——
Acute appendicitis unruptured:		
Number of cases	34	228
Deaths	0	2
Mortality, per cent	0	0.87
Acute appendicitis ruptured:		
Number of cases	29	59
Deaths	5	2
Mortality, per cent	17.2	3.3
Subacute appendicitis:		
Number of cases	25	223
Deaths	0	1
Mortality, per cent	0	0.44
Chronic appendicitis:		
Number of cases	273	169
Deaths	1	0
Mortality, per cent	0.36	0
Total number of cases	361	679
Total deaths	6	5
Mortality, per cent	0.66	0.73

The mortality rate of all cases of appendicitis in 1930 was obtained from 11 hospitals in Washington, D. C., and this takes in the bulk of the cases occurring in the city. In these hospitals the majority of the cases are operated upon by visiting surgeons and most of the cases reported are private cases.

A study of Table IV shows that in the year 1930 there were in these 11 hospitals a total of 2,615 cases of appendicitis, excluding the ruptured type, operated upon, with 25 deaths, making a mortality rate of 0.95 per cent. The number of ruptured cases operated upon was 182 with 34 deaths, making a mortality rate of 18.7 per cent. There were 1,193 operations for acute appendicitis with 19 deaths, making a mortality rate of 1.59 per cent. There were 422 operations for subacute appendicitis with 2 deaths, making a mortality rate of 0.4 per cent. One thousand operations for chronic appendicitis were performed with 4 deaths, making a mortality rate of 0.4 per cent. The mortality rate in all the types was 2.08 per cent.

A study of Table IV shows one point very clearly, that the bulk of the mortality lies in the ruptured cases of appendicitis. This at least is true in the cases here reported. Of course it can be said that some of the 18.7 per cent mortality is due to the improper surgical treatment given the patient, and that is very true; however, the low mortality obtained in the unruptured and chronic case was obtained in cases operated upon by the same men. As said before, the amount of surgical thought and skill required to properly handle the patient with a ruptured appendix is far more than that required to handle the simple case of appendicitis. It has been said that the surgeon of today does not know the principles of the treatment of peritonitis as described and practiced by Ochsner, Murphy and very properly termed "physiological rest" by Deaver. However, I feel firmly convinced that there has been a decided improvement in our treatment of ruptured appendicitis with peritonitis in the past few years. Standardization of the hospitals and a higher standard of men with operating privileges in the hospitals, improvement in anesthetics, the more frequent use of transfusions, appreciation of the dangers of dehydration and acidosis, and increase in

TABLE VII

	PER CENT OF 83,144 CASES REPORTED
General mortality	4.09
Acute cases	4.88
Chronic cases	0.99
Suppurative cases	10.15
Gangrenous cases	8.73
Spreading peritonitis	21.19

knowledge to combat these conditions have all made for better treatment. With all these factors in mind, even though this rate of 18.7 per cent can be reduced by the better care of the patient, there is still a decided difference in the operative rate between the ruptured and the unruptured cases of appendicitis which cannot be attributed to the operative treatment per se, but which must be attributed to the virulence of the disease, the resistance of the patient and the stage of the disease in which the patient is operated upon.

CONCLUSIONS

One very definite conclusion can certainly be drawn from this study, and that is that the most of the mortality in acute appendicitis comes in the ruptured group. The difference in mortality between the ruptured and unruptured groups is only part of the story, however, for there is an increase in the morbidity, complications and delayed convalescence in the ruptured group. It seems that the way to reduce this mortality is to have the patient with appendicitis operated upon before peritonitis develops. In order to do this the public must be educated to the importance of early operation and to the value of calling a doctor in all cases of abdominal pain. In turn the physician when called has a big duty and responsibility in properly caring for the patient until a positive diagnosis can be made and the proper treatment instituted.

Science Series. No. 6

THE PHYSICOCHEMICAL NATURE OF THE ARSPHENAMINES AND THEIR DECOMPOSITION

GEORGE B. ROTH, M.D.

Professor of Pharmacology, George Washington University School of Medicine

In the approximately two decades that have elapsed since the synthesis of arsphenamine by Ehrlich and Bertheim and its introduction into therapeutics, an unusual amount of literature, biochemical and clinical, has accumulated. In spite of the numerous investigations that have been made, the nature as well as the behavior of the arsphenamine compounds in the body is still largely obscure. Voegtlin in a comparatively recent review of the pharmacology of the arsphenamines stated that, "for a better understanding of their pharmacological action further work on the physicochemical behavior of these compounds . . . . is greatly needed."

The term arsphenamine has two distinct meanings. When used in the generic sense it denotes any of the trivalent arsenicals represented by the formula $R \cdot As = As \cdot R$, in which R represents the phenyl residue. In this sense it includes commercial arsphenamine (Salvarsan), neoarsphenamine (Neosalvarsan), sulpharsphenamine (Sulfarsenol) and others less well known. When the term is used in a restricted sense it denotes the official or U. S. P. preparation listed as arsphenamine, which is the dihydrochloride of diamino arsenobenzol. It is commonly called commercial arsphenamine, is freely soluble in water, and its aqueous solution is strongly acid.

Neoarsphenamine is the condensation product resulting from the replacement of the hydrogen of one amino-group of the arsphenamine base by sodium formaldehyde sulphoxalate. This compound is freely soluble in water, its aqueous solution being neutral or faintly alkaline to litmus.

The arsenic content of arsphenamine and neoarsphenamine is 30 and 20 per cent respectively.

When one considers the members of this group from the standpoint of therapeutic usage, he is concerned mainly with arsphenamine and neoarsphenamine. It has been estimated on the basis of output from our leading factories that about 90 per cent of this type of compounds is neoarsphenamine and practically all of the remainder is arsphenamine.

One must not be misled by the termination "ine" in the official names and conclude that the compounds are pure substances like some of the tertiary amines, the alkaloids strychnine and morphine for instance, which may be purified by crystallization.

Arsphenamine is obtained by the reduction of pentavalent arsenic acids into the trivalent arseno form, and when reduced to this form the crystalline nature of the pentavalent acids is changed, a strong tendency to form gelatinous products being manifested. As a consequence the arseno compound is amorphous, insoluble in water and non-crystallizable, whereas its soluble acid salts, among which is commercial arsphenamine, are gelatinous-like substances when placed in water, and are incapable of crystallization. Manufacturing chemists find it impossible to free the arsphenamines from impurities in the ordinary manner and are forced to exercise unusual care with respect to their purity in the selection of the chemicals required for the synthesis of these products.

Sherndal has had an extensive experience with the method of manufacture of arsphenamine and is inclined to regard commercial arsphenamine not as a compound represented by the generally accepted formula $HCl \cdot R \cdot As = As \cdot R \cdot HCl$, but as its polymer $(HCl \cdot R \cdot As = As \cdot R \cdot HCl)x$. This characteristic would endow arsphenamine with properties similar to substances when they exist in a colloidal state. Sherndal has examined all the commercial arsphenamines found upon the market and from observations on their chemical behavior has concluded that the products may be assumed to be "structurally" identical, and furthermore that the differences which were found were physical in nature.

One should not expect to find absolute uniformity among market samples of arsphenamine, since slight variations in the technical steps of the manufacture alter the final product quite markedly. The only checks on the final products are determination of the arsenic content and tests on rats. However, the variation in arsenic content does not run parallel with toxicity, nor do the tests on rats as conducted at present determine actual toxicity; they guard against undue toxicity, but do not reveal whether there is any variation among the various lots manufactured.

I have shown that great care is required for the manufacture of arsphenamine; the physician should be equally meticulous in making up the solution required for intravenous use. There are three methods for preparing arsphenamine for intravenous therapy. These have been designated by a governmental board* which has issued standard instructions for its preparation under the headings: (a) The exact method, (b) the approximate method, (c) the "haphazard" method.

Before considering these methods somewhat in detail one must have clearly fixed in mind the findings of Elvove and Clarke that the aqueous solution of commercial arsphenamine is strongly acid (pH 2.3), the acidity of a one-hundredth molecular solution (practically three-tenths per cent) being about that of one-hundredth normal hydrochloric acid.

The acid solution is clear but cannot be injected on account of its high toxicity; to reduce its toxicity this acid salt, the dihydrochloride, is converted into the corresponding alkaline disodium salt, which is also soluble in water. These reactions depend upon the fact that the arsphenamine base is an ampholyte which is insoluble at about the point of neutrality and soluble in either acid or alkaline form, thus showing a similarity to the protein molecule.

The exact or approved method requires the addition, at one time, of the amount of sodium hydroxide necessary to form the disodium salt, that is 0.85 cc. of normal sodium hydroxide for each 0.1 gram of commercial arsphenamine employed.

In the approximate method the exact concentration of the alkali used is unknown. Let us say that a 4 per cent solution of sodium hydroxide is used. Upon adding this gradually to the acid solution a precipitate of the base forms which redissolves when a little over one-fourth of the alkali needed to form the disodium salt is added, the precipitate no longer redissolves and from this point on a precipitate appears until three-fourths of the alkali necessary to form the disodium salt has been added. The clear alkaline solution thus formed is the monosodium salt and should not be injected until one-third more of the amount of alkali required to bring it to clearing has been added as a final step, thereby forming the disodium salt and thus replacing both hydrogen atoms of the phenolic groups.

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* Pub. Health Rep., 1922, **37**, 1867; Gov. Print. Off. Reprint No. 774.

The "haphazard" method is the old method as originally introduced and consists of the use of a strong solution (15 per cent) of sodium hydroxide. This is added drop by drop until clearing occurs, and then one or two drops are added regardless of whether the solution contains one or more doses. This method should be condemned because it is inexact and because such a solution is more toxic than a solution of the disodium salt, as Roth has shown.

When the disodium salt is formed the solution has a high alkalinity, the pH being about 11.3 (Elvove) or practically equal to the alkalinity of a tenth normal solution of ammonium hydroxide.

Bearing in mind that the alkalinity of the body tissues is about 7.3 and that proteins dissolve in an excess of alkali one can readily understand why a solution of the disodium salt will give rise to local effects, irritation, pain, tissue contraction, precipitation of blood elements, etc., when a concentrated solution is injected into the sheath instead of the lumen of the vein. In such cases dilution with water or some other solution such as glucose or thiosulphate is necessary. The gross physical effects resulting from the addition of sodium hydroxide to an aqueous solution of commercial arsphenamine have been mentioned above and are familiar to all; relatively few physicians seem to realize, however, that this is one of the most critical stages in the clinical use of the drug. They do not know or they forget that the gelatinous precipitate that is formed when alkali has been added and redissolves when more alkali has been added forms a solution, the character of which is in no manner like that of an ordinary crystalloid such as sodium chloride.

The experiments that have been made to ascertain the nature of both acid and alkaline solutions of the arsphenamine base lead most investigators to conclude that arsphenamine exists in such solutions in the form of rather finely dispersed molecular aggregates. Among the first to investigate this question was Bauer. Using diffusion capsules he found that solutions of both the dihydrochloride and disodium salts would dialyze poorly against water but that the alkaline showed a little more dialysis than the acid salt. Using the Bechold ultrafiltration method which employs a collodion filter under pressure, he obtained a more rapid and a more nearly complete filtration from the alkaline than from the acid salt. When he separated a solution of the disodium salt into two parts and subjected one part to ultrafiltration at once and allowed the other part to stand two days under the exclusion of air, the former would filter through incompletely, whereas the latter all passed through the filter. This was considered to be due to the breaking up of the aggregates into a filterable size, that is, they had become peptized. Neoarsphenamine left no residue upon ultrafiltration (Bechold method) but passed poorly through a diffusion capsule. From his experiments he concluded that the arseno compounds occupied a transition range between the colloids and crystalloids and from this point of view may be spoken of as semicolloids.

Klemensiewicz noticed that acid arsphenamine solutions behaved like emulsoid colloids on standing; they increased in viscosity. He attributed this increase to the polymerization of the arsphenamine.

Raiziss and Gavron dialyzed arsphenamine solutions through parchment against water in the absence of air and found that both dialyzed poorly, the disodium better than the acid salt. Neoarsphenamine showed about the same rate of dialysis as the disodium salt. From their investigations they were led to regard arsphenamine as a reversible colloid in most respects.

Hunter and Patrick determined the pH and conductance values of solutions of acid and alkaline arsphenamine and found that the pH changes upon acidification of an alkalinized solution were identical, the reverse occurring during alkalinization; whereas conductance measurements showed that there was a physical difference between the acid and alkaline solutions, the alkaline upon acidification showing abnormal conductance, dropping at one stage to a value which is characterized by the molecular form of the drug. On the basis of the latter finding they considered arsphenamine to be a colloidal electrolyte, particularly when in alkaline solution.

Since the findings obtained by the several investigators mentioned enable one to class the arsphenamines among the colloids I shall briefly consider the biological meaning of these facts. It is known that there exists a definite relation between the toxicity of matter in the colloidal and ionic forms, the former (arsphenamine) being less toxic than the latter (sodium arsenite). This is due to the fact that the latter compound has its ions of arsenic free to act, whereas arsphenamine is slowly converted into more active ionic arsenic. Although colloidal solutions are relatively non-toxic they may give rise to reactions in the body, especially when given intravenously, due primarily to the physical state of the colloidal solution. If the colloidal solution is relatively stable and finely dispersed it may be given without reaction, but when coarsely dispersed and relatively labile or easily changed into an ionic form marked reactions will occur. Very simple procedures, such as the standing or the heating of colloidal solutions, will often affect their toxicity.

The following investigations confirm the above statement. Hunt found that by warming some of the more inherently toxic solutions of arsphenamine in the absence of air their toxicity could be reduced. He suggested that this phenomenon may be due to the "solution" or dispersion of the aggregates by the heat, the smaller units being less liable to be thrown out of solution by various conditions such as electrolyte content, reaction of blood, etc., than are the larger units. Roth showed in the following manner that a freshly alkalinized arsphenamine solution was more toxic than one which stood for twenty minutes. One hundred and thirty sets of five rats each were injected intravenously with the same dose of arsphenamine. This dose was large enough to kill one or more of the rats in each set. Thirty-six per cent of the rats which died were the first to be injected, 22 per cent died among those injected second, and 18 per cent among the fourth and fifth in each set. Since it required about twenty minutes to inject each set one may conclude that a solution of disodium arsphenamine is rendered less toxic by standing for this length of time. This phenomenon is probably due to differences in the size of the colloidal aggregates, the first solution being nearer to the gel form in which it originally existed than the latter.

The well-known greater toxicity of acid over alkaline solutions of arsphenamine is directly correlated with the differences in their behavior towards membranes, the former diffusing less readily than the latter, which indicates that the degree of dispersion plays an important part in toxicity (Roth). Again one notices a parallelism between the toxicity and the physical properties of disodium arsphenamine and neoarsphenamine. Given to rats intravenously the lethal dose expressed in terms of arsenic for disodium arsphenamine is about 50 mg. per kilogram of body weight, whereas it is about 60 mg. for neoarsphenamine.

The effect of the colloidal state on the toxicity of matter, in this case the arsphenamines, can in no way be separated from the effects which are produced by agencies acting in a purely chemical manner, and one must always keep in mind the comparative ease with which aqueous solutions of the arsphenamines are decomposed in the presence of oxygen.

Aqueous solutions of the dihydrochloride are relatively stable in the presence of oxygen, whereas solutions of the disodium salt as well as of neoarsphenamine are easily decomposed. Hata and Shiga found that solutions of the disodium salt decomposed less rapidly in air than solutions of neoarsphenamine. Arsphenamine required six hours to more than double its toxicity; neoarsphenamine required only about half an hour to increase in toxicity to a similar degree. These findings have been verified by every investigator in this field. Roth took a four per cent neoarsphenamine solution and divided it into two parts; one part was shaken for one minute in the presence of air, the other part served as control. When rats were injected intravenously with an otherwise tolerated dose of the shaken solution, all died; those which received the same dose of the unshaken solution lived. It was further found that shaking this solution for ten minutes would increase its toxicity over four-fold. The increase in toxicity was shown to be due to the oxidative changes, inasmuch as shaking in the absence of air had no effect on toxicity. It is thought that the changes which solutions of the arsphenamines undergo in the presence of oxygen are the cleavage of the arsenobenzol molecule into two phenyl arseno groups and subsequent oxidation of these groups to phenyl arsen-oxide. If the oxidation proceeds further the corresponding pentavalent arsenical will be formed. These changes may be indicated as follows:

$$R \cdot As = As \cdot R \longrightarrow 2(R \cdot As) \longrightarrow 2(R \cdot As \cdot O) \longrightarrow 2R \cdot AsO_3H_2$$

If these statements are facts one should expect corresponding changes in the toxicity at the various stages of oxidation. Comparing the toxicity of commercial arsphenamine with the oxidized product arsen-oxide, it has been found that the latter is about 7 to 10 times as toxic as the former, or about the same order of toxicity as that of the arsenites. When oxidation proceeds to the pentavalent stage the toxicity decreases and is about the same as that of the arsenates. Mayer found that a solution of neoarsphenamine in the presence of air will increase in toxicity for mice until it reaches a maximum of 40 times that of the original solution; continued oxidation from this point will decrease its toxicity to only 5 times that of neoarsphenamine, a figure which would correspond well with the order of toxicity of pentavalent inorganic arsenicals.

The same relative difference in the decomposition of arsphenamine and neoarsphenamine as seen in their solutions appears when the dried powdered preparations are exposed to air, arsphenamine being relatively much more stable than neoarsphenamine. Although both substances are marketed in glass ampules and are sealed in the presence of an inert gas or in the absence of air, decomposition has been shown by Roth to occur in commercial samples of neoarsphenamine and decomposition in ampules to be hastened by heat. Experiments showed that some lots were practically unchanged upon heating in ampoule to 100°C. for twenty minutes, whereas other lots showed marked decomposition under the same conditions.

Thus far we have not discussed these compounds from the standpoint of their behavior towards electrolytes or a hydrophilic colloid such as blood serum. Since these compounds are both given intravenously and we are dealing with relatively unstable colloidal solutions in both instances, (the arsphenamines and blood serum), the behavior of the arsphenamines in the presence of electrolytes and of blood serum is well worth considering briefly.

Johnson determined the osmotic pressure of arsphenamine and neoarsphenamine solutions and found that a 5 per cent solution of neoarsphenamine was practically isotonic with that of the blood. He encountered considerable variation in various samples. Many samples were found that had a greater osmotic pressure, while some were lower. One, therefore, should not expect very marked salt effects from the use of a 5 per cent neoarsphenamine solution. A 2 per cent solution of disodium arsphenamine was found to be practically isotonic with human blood. Since an isotonic solution of disodium arsphenamine is too concentrated for intravenous use and is always diluted to about a 0.3 per cent solution, it becomes of importance to determine whether this 0.3 per cent hypotonic solution can be made isotonic with the blood by means of an electrolyte without altering the stability of the solution. Schamberg and collaborators have answered this question. These observers by means of in vitro experiments found that a half per cent sodium chloride solution had a slight precipitant action on the monosodium salt of arsphenamine but had no effect on the disodium salt. Using human blood they found that acid solutions of arsphenamine in concentration of 0.25 per cent or more will precipitate human blood, whereas the disodium salt did not precipitate it. When arsphenamine was dissolved in physiologic salt solution, the results were practically the same. Neoarsphenamine in as high a concentration as 40 per cent was not precipitated in the presence of serum.

The above survey of the literature, though incomplete, may be taken as an index of the conclusions that may be drawn from a complete digest of the numerous papers on the subject. This survey has shown that the arsphenamines are rather unique electrolytes, behaving in many respects like proteins, and that a knowledge of their physical nature is as important for the clinician as it is for the manufacturer.

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ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Pyorrhea Alveolaris as a Factor in Focal Infection and Its Prompt Elimination,"* by **Arthur B. Crane, D.D.S.**, and **Harry Kaplan, D.D.S.**

The most important feature of the normal anatomy of the supporting structures of the teeth is the marginal gingiva which lies in contact with the enamel but is not attached to it. The space which exists between this tissue and the enamel is known as the gingival crevice. Without a break in the epithelium at this point there can be no true pyorrhea alveolaris. The epithelium lining the crevice is much thinner than elsewhere on the gums, hence, this is the most susceptible point for infection to gain a foothold.

The attempt to establish a specific bacteriodiagnosis has not met with success for the reason that there are constantly many species of pyogenic bacteria in even the most healthy mouth. The bacteria become a factor only when there is a break in the surface tissue.

The pathology of pyorrhea can be most effectively studied by means of microscopic sections. Properly prepared specimens will show a breaking down of the anatomy of the marginal gingiva, with extensive degenerative changes in its epithelium. The underlying connective tissue which has been thus exposed to infection is disorganized and infiltrated. Broken down tissue cells and small fragments of necrotic bone are being discharged into the gingival crevice. Beyond this discharging area granulomatous tissue almost completely closes off an area of active destruction which is in progress at the point of the alveolar crest. Here are found broken down tissue cells, extravasated red blood cells, and many necrotic bone fragments cast off from the alveolar crest. From the standpoint of absorption this condition is similar to that of any other closed infected cavity.

The roentgenographic study of pyorrhea is concerned with the interproximal septum of bone. When this is normal a continuous opaque line will be seen following the roots of the teeth and covering the pointed alveolar crest. This line represents cortical bone. After middle life the point of the septum becomes more or less flattened and recedes away from the enamel of the tooth. As long as the opaque line is unbroken it indicates an absence of disease in the underlying structures. When pyorrhea becomes established the opaque line covering the crest disappears and the underlying bone has a rarefied appearance.

The operation which we advocate consists of a careful dissection by which the diseased tissues are eliminated with as little destruction of healthy tissue as possible.

In successful cases the disease as a factor in focal infection is immediately eliminated and in less than three weeks the whole area of operation is covered with normal epithelium.

Roentgenograms made a year or more after operation will show the restoration of the opaque line previously referred to. The new gums will continue to thicken and harden and will eventually form a normal festoon about the necks of the teeth without pocket formation.

When properly performed this operation does not cause any unnecessary loss of tissue. The esthetic appearance at the end of a year is better than in cases successfully treated by other methods. Physicians whose understanding of pathology leads them to fear the incomplete elimination of chronic infection and to view with apprehension methods of elimination which require a long time for their effectiveness should find in the surgical method a prompt aid in the control of metastatic diseases.

Discussion: Drs. H. W. Jaeger, James A. Flynn and R. A. Keilty.

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* Presented November 25, 1931.

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HEPATOSPLENOGRAPHY

In the Bulletin of the Medical Society of the District of Columbia in November, 1931, an article appeared entitled "Hepatography and Lienography." It dealt with a method of visualization of the liver and spleen after the intravenous injection of a radiopaque substance of high atomic weight which is phagocytized by the reticulo-endothelial cells of the body. The substance used was thorium dioxide sol. The development of this method is due largely to the work of Radt, Oka and Kadrnka since 1928. Relatively little clinical experience has been acquired with this method. In this country about three groups have used it in a few cases. The article in the Bulletin in November was the first to appear in any publication in North America or in English and reported briefly experience with eight patients at Georgetown University Hospital. Since then other patients have been examined, making a total of more than fifty. A severe immediate reaction occurred in only one patient who recovered without apparent residual injury. Remote ill effects were not noted in any of the patients even after many months, in spite of the fact that the metal is very slowly excreted and remains in the body probably for years. Published work on animals which have had the metal in their tissues for long periods of time has not shown morbid changes resulting from the presence of this foreign substance in the reticulo-endothelial cells. The amount used in patients is undoubtedly far less than the amount which would cause complete "blockade" of the reticulo-endothelial system. Radioactivity of the metal is negligible. The diagnostic value of the method was discussed on May 13 at the American Medical Association convention in New Orleans from a study of forty patients in Washington by Yater and Otell. It was possible to determine alteration in size of the liver and spleen, the presence or absence of metastases in the liver, the presence and degree of cirrhosis of the liver, the existence of nodular syphilis of the liver (hepar lobatum), the presence of primary tumor of the liver, the presence of ascites, and whether a mass in the upper abdomen was liver or spleen or a tumor of some other organ. In many cases operation, biopsy or necropsy confirmed the information obtained by this new method. Since the metal remains so long in the liver and spleen it is possible to follow the progress of diseases of these organs. It is probable that rupture of the liver and spleen may be demonstrable. In discussion of this paper Harris of New Orleans reported work with rats in which an unknown amount of this metal injected into the tail apparently resulted in fibrosis of lymph nodes. Tripoli of New Orleans, however, in work more nearly approximating the conditions of the use of the method in man, did not find organic changes in animals. If tremendous doses were used he observed that parenchymatous cells contained the metal as well as the reticulo-endothelial cells, but that fibrosis did not even then result. More work will no doubt have to be done in order to determine whether ultimate harmful effects may be expected, but to date there is no good reason to suppose that the test is dangerous. The test will probably come to be used as extensively as the Graham-Cole method of visualization of the gall bladder and will give more valuable information even than that test. Inasmuch as early diagnosis of disease of the liver is so difficult, any additional method of accurate diagnosis is of great value.

THE NEW ORLEANS SESSION

It is well for the physician to take periodic inventories of the stock in trade that is peculiarly his, the accomplishments, the discoveries, and particularly the control experiments in medicine. These he cannot well obtain from the study of his own case records. Even the reading of scientific journals is liable to result in superficial appreciation followed too soon by mental indigestion and forgetting. The annual sessions of the American Medical Association provide the mental conning tower from which the physician may view the progress of medicine. Here is assembled the greatest number of physicians annually gathered into conclave. Here before the fifteen sections may be found a wealth of scientific presentation. Here in the scientific exhibit may be found graphic representation of problems of all types. Here may be found the latest practical developments in instrumental, dietetic, physiotherapeutic and literary lines which keen competition may bring forth from commercial firms. Finally, here may be found the man with similar aims, ideals and practices, who may be solving his own problems more successfully than you are. The greatest asset of the physician is his ability to progress, to perfect himself so as to render better service to his patients. New ideas, therefore, are ever welcome. One first-class idea is sufficient reward for the long trip to the session. The New Orleans session presented no revolutionary schemes, no world-saving discoveries. That was to its credit. It did present, however, a multitude of first-class ideas. Coöperation among specialists was indicated by scientific exhibits on poliomyelitis and on cancer. Moving pictures were exhibited in half a dozen smaller theatres in the auditorium, each one controlled by a Section. The scientific exhibit, while not as large as last year, was more carefully selected and demonstrated. The gold medal went to the Hartman group of Buffalo for the cortin demonstration. Undoubtedly the hospitality for which residents of New Orleans are justly famous made some inroads on the attendance at scientific sessions of the Sections. Although the total registration was only a third of last year's, the physicians who went to New Orleans put in a week of profitable work and few came away disappointed.

THE SCIENTIFIC PROGRAM OF THE SOCIETY IN 1932–1933

All will probably agree that the character of the program during the past year has in general been of high caliber. The Annual Meeting of the Society was well attended and the program and scientific exhibits comprehensive. The program committee naturally desires to continue the high standard set during the past year and if possible to raise it still higher. To these ends the committee wishes to urge all members of the Society who contemplate reading papers to begin their preparation early and to communicate with the members of the program committee during the summer in order that the committee may be able to plan in advance. Members of the committee are Wallace M. Yater, chairman, C. R. L. Halley, and Daniel L. Borden.

CORRECTION

On page 114, May Medical Annals, Dr. H. A. Fowler's name was erroneously attached to a discussion of Dr. R. M. LeComte's paper given by Dr. W. Calhoun Stirling.

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G. Victor Simpson, *Secretary*
John H. Trinder, *Treasurer*

Executive Committee:
The Officers
Edward R. Gookin
Carl Henning

Section on Pathology and Laboratory Medicine

Eugene R. Whitmore, *Chairman*
Tomas Cajigas, *Vice Chairman*
H. H. Leffler, *Secretary-Treasurer*

SECTION ON NEOPLASTIC DISEASES ORGANIZES

The Section on Neoplastic Diseases was organized at its meeting held June 1. The following officers were elected for the ensuing year:

Eugene R. Whitmore, *Chairman*
Oscar B. Hunter, *Vice Chairman*
H. H. Leffler, *Secretary-Treasurer*
Executive Committee:
The Officers
Edmund Horgan
E. A. Merritt

Regular monthly meetings will be held from October to May inclusive at the different hospitals in Washington, and it is hoped to make arrangements to have one or more meetings before the general Society. The business meeting will be held in connection with the October and May meetings. There are no dues for membership in the Section, and all members of the Medical Society of the District of Columbia are invited to become members and to take an active part in the work of the Section.

Opportunity is afforded the profession in the District of Columbia to take an active part in this movement, which has as immediate objectives the bringing of the cancer death rate in the District of Columbia to the level reached in neighboring states, and the placing of our Society in its proper place, in the front line in the fight for the control of cancer.

WASHINGTON PROFESSION HONORED AT NEW ORLEANS MEETING

The Woman's Auxiliary to the Medical Society of the District of Columbia will be represented in the list of officers of the Woman's Auxiliary to the American Medical Association by Mrs. Arthur C. Christie, who was unanimously elected Vice President.

At a meeting of the Medical Woman's National Association in New Orleans, Dr. Mary O'Malley was elected to the office of Second Vice President.

Dr. Edmund Horgan, by action of the Board of Trustees of the American Medical Association, has been appointed, together with Dr. George H. Simmons and Dr. Henry O. Reik, to represent the American Medical Association at the convening of the British Medical Association in London, July 25, 1932.

Dr. Henry C. Macatee, Delegate to the American Medical Association, was appointed a member of the important Committee on Hygiene and Public Health at the assemblage of the House of Delegates.

AMERICAN THERAPEUTIC SOCIETY

At the 33d Annual Meeting of the American Therapeutic Society, held in Baltimore, Maryland, on May 16 and 17, the following officers were elected for the coming year:

Frank Smithies, Chicago, Ill., *President*
Julius Friedenwald, Baltimore, Md., *1st Vice President*
Alpheus F. Jennings, Detroit, Mich., *2d Vice President*
Grafton Tyler Brown, Washington, D. C., *3d Vice President*
Oscar B. Hunter, Washington, D. C., *Secretary*
Alphonse McMahon, St. Louis, Mo., *Treasurer*

MEDICAL SOCIETY OF MARYLAND, VIRGINIA AND DISTRICT OF COLUMBIA

The annual election of officers of the Medical Society of Maryland, Virginia and District of Columbia, at meeting held in Norbeck, Maryland, May 18, resulted as follows:

Guy W. Leadbetter, *President*
Samuel A. Nichols, *Vice President*
W. Allen Griffith, *Vice President*

Robert E. Moran, *Recording Secretary*
Joseph D. Rogers, *Corresponding Secretary*
Robert Scott Lamb, *Treasurer*

PAN-AMERICAN MEDICAL ASSOCIATION

The Pan-American Medical Association will be represented in the District of Columbia. The following officers have been elected at a meeting of a recent organization of local members:

Hugh S. Cumming, Surgeon General of the Public Health Service, *President*
J. M. Puig Casauranc, *Vice President*
Jose G. Lewis, *Vice President*
Aristides A. Moll, *Secretary*

This Association is active not only in the United States but in many of the South American countries. At a meeting held at the Mexican Embassy on May 31 addresses were given by Dr. Bolivar J. Lloyd on "The Present Status of the Yellow Fever Situation," and Dr. Wallace M. Yater whose subject was "Modern Concepts of Heart Disease." Surgeon General Hugh S. Cumming presided.

GEORGETOWN GROUP DISCUSSES "WHO SHALL STUDY MEDICINE?"

The Georgetown Chapter of the American Association of University Professors held an open meeting in the lounge of Copely Hall, Georgetown College, May 16th at 8:15 p.m. The Hon. Jesse C. Adkins, President, presided. Dr. H. W. Tyler, General Secretary of the national organization, gave a brief talk on the history of the Association, and then the previously announced symposium on "Who Shall Study Medicine?" followed. Dr. Jacob Markowitz, professor of physiology in the Georgetown University Medical School led the discussion. He treated the intellectual qualifications necessary for admission to a medical college, and expressed his belief in the essential soundness of the aptitude test and emphasized the desirability of the premedical student's showing intense and lasting interest in any particular premedical subject as an evidence of mental alertness and general ability. Fathers Gipprich and Burke participated in the discussion, emphasizing other, mainly moral, qualifications necessary for the practising physician. The Rev. W. Coleman Nevils, S.J., President of Georgetown University, honored the Chapter with his presence.

THE SURGEON GENERAL'S LIBRARY

Anent the activities of certain individuals and organizations to bring about the placing of the Surgeon General's Library adjacent to the Library of Congress, instead of placing it at the Army Medical Center at Walter Reed General Hospital, it may be said that they have failed in so far as gaining the support of the American Medical Association. The House of Delegates has gone on record as favoring the placing of this library in its logical place, at Walter Reed General Hospital. In this connection it should be noted that a resolution favoring this action, adopted by the Medical Society of the District of Columbia, was presented by our Delegate at the New Orleans meeting.

REPRINTS RECEIVED

The following reprints have recently been received for which due acknowledgment is made:

"The Intra-Muscular Injection of Liver Extract in Cases of Pernicious Anaemia," Virginia Medical Monthly, May, 1932, by J. Lawn Thompson, A.M., M.D.
"Lung Abscess Following Tonsillectomy," Archives of Pediatrics, November, 1931, by Joseph S. Wall, M.D.
"A Study of the Circulatory System of 150 Adolescent Girls, Participants in or Candidates for Competitive Athletic Sports," Virginia Medical Monthly, October, 1931, by Coursen B. Conklin, A.M., M.D.

ADDITION TO LIBRARY

Acknowledgment is made, with thanks, of the recent contribution to the Library entitled "Papers on Surgery and Other Subjects by George Tully Vaughan, M.D., LL.D., F.A.C.S.," by the author.

William Williams Keen, M.D., eminent surgeon, honorary member of the Medical Society of the District of Columbia since 1905, died on June 7, 1932, at the age of 95 years. Mrs. Corinne Keen Freeman, President of the Woman's Auxiliary to the American Medical Association is Doctor Keen's daughter; Dr. Walter Freeman, active member of this Society, his grandson. The members of the Washington profession deplore the loss of this esteemed member. Appropriate expression of the Society's appreciation of his life and works will duly appear in the minutes and a copy will be sent to the family of the deceased.

Clarence Henry Howland, D.D.S., an associate member, died June 4, 1932, at the age of 77 years. A member of the American Association for the Advancement of Science, Washington Biological Society and outstanding dental organizations, he was prominent in his profession in Washington for years.

Silvanus Blanchard Newton, M.D., an associate member, died April 30, 1932. His activities in the Army during the late War were a source of much commendation from national authorities.

A committee has been named to present at an early date appropriate testimonial of the Society's regard for these distinguished associate members.

WASHINGTON HEART ASSOCIATION

The annual meeting of the Washington Heart Association was held at the residence of Dr. Thomas S. Lee on the evening of June 13. About forty physicians were present. Dr. I. C. Riggin, Executive Secretary of the American Heart Association, was present and addressed the assembly. He told about the work of the American Heart Association and made suggestions regarding the program of activity of the Washington organization. Doctor Lee as president of the Washington Heart Association spoke of prospects for the coming year, particularly the opportunities afforded for instructing the public through a central office and the organization of clinics. According to the Association's policy of annually inducting new officers, balloting followed. The newly elected officers are:

James Alexander Lyon, *President*
Lewis C. Ecker, *Vice President*
James W. Esler, *Secretary-Treasurer*

A delicious buffet luncheon was served after the meeting. Future developments of the Washington Heart Association will be published in the Annals.

THE SOUTHERN SURGEON

Volume I, Number 1, The Southern Surgeon, has appeared. The format is particularly pleasing. From the caliber of the articles published with illustrations we may predict much success for this new undertaking in the Southern journalistic field. The list of contributors to the first number really constitutes a page from a "Who's Who" list of men devoting themselves to surgery in this country. Those responsible for the publication are:

L. Minor Blackford, M.D., *Editor*
B. T. Beasley, M.D., *Managing Editor*
Gilbert F. Douglas, M.D., *Assistant Editor*
Roy B. McKnight, M.D., *Associate Editor*

Dr. B. T. Beasley is also Secretary of the Southeastern Surgical Congress.

The Medical Annals of the District of Columbia extends its best wishes to the editorial management in their new effort.

GEORGE WASHINGTON UNIVERSITY COMMENCEMENT

At the One Hundred and Eleventh Annual Commencement of the George Washington University recently held in Constitution Hall, Washington, Dr. Frederick Parker Gay delivered the address. Three outstanding bacteriologists, Theobald Smith, Walter Reed and Frederick F. Russell, who had been teachers in the George Washington University Medical School were mentioned and the value of their investigative work to public health stressed. At the conclusion of the exercises the honorary degree of Doctor of Science was conferred upon

Alan Mason Chesney, Dean of Johns Hopkins Medical School
George Canby Robinson, Dean of Cornell Medical College
Frederick Parker Gay, Professor of Bacteriology, Columbia University

SMALLPOX IN THE UNITED STATES AND CANADA, 1931[*]

Reports from 43 states, the District of Columbia, and 8 Canadian provinces indicate a decided decrease in the prevalence of smallpox in these areas during the year 1931. The case-fatality rate, however, showed no appreciable reduction.

The two tables that follow show the number of cases, deaths, and case-fatality rates that prevailed in a number of American states and Canadian provinces and in groups of cities within these areas:

Smallpox Cases, Deaths and Case-Fatality Rates, Years 1929–1931, for 43 States, District of Columbia, and 8 Canadian Provinces

AREA	1931			1930			1929		
	Cases	Deaths	Deaths per 100 cases	Cases	Deaths	Deaths per 100 cases	Cases	Deaths	Deaths per 100 cases
United States and Canada	26,869	93	.35	44,977	160	.36	40,033	127	.32
United States (43 States and District of Columbia)	26,004	91	.35	43,694	158	.36	38,048	120	.32
Canada (8 Provinces)	865	2	.23	1,283	2	.16	1,985	7	.35

Smallpox Cases, Deaths and Case-Fatality Rates, for the Years 1929–1931, for 626 United States Cities and 85 Canadian Cities

AREA	1931			1930			1929		
	Cases	Deaths	Deaths per 100 cases	Cases	Deaths	Deaths per 100 cases	Cases	Deaths	Deaths per 100 cases
United States and Canadian Cities (711)	7,946	13	.16	11,972	24	.20	11,414	33	.29
United States Cities (626)	7,470	13	.17	11,637	24	.21	10,705	32	.30
Canadian Cities (85)	476	0	0	335	0	0	709	1	.14

The total number of cases, it will be noted, declined from 44,977, in 1930, to 26,869, in 1931. In the United States alone, the drop was from 43,694 cases to 26,004, and in Canada, from 1,283 to 865. The case-fatality rate, however, was not appreciably reduced except in the urban centers of the United States, where the rate recorded for a group of 626 cities was only .17 per hundred cases, as compared with .21 in 1930. In 85 Canadian cities, there have been no deaths from smallpox during the past two years, and only one fatal case was reported in 1929.

Lest we become too complacent over these figures, it is well to realize that, of the 26,004 cases of smallpox reported in 43 states last year, at least 86 per cent, or 22,413 cases, occurred in but 19 states, lying chiefly in the north central and western sections of the country. Two states—Kansas and South Dakota—reported more than one case per thousand of population, and three others—Indiana, Iowa and Vermont—just barely missed that ratio. Indiana, alone, recorded more than three thousand cases; Iowa and Kansas, well over two thousand each, and Illinois, Ohio, Oklahoma and Texas, very close to that number.

Selected States and Canadian Provinces showing Above-Average Prevalence of Smallpox During the Year 1931: Total in the states of Arkansas, California, Idaho, Illinois, Indiana, Iowa, Kansas, Louisiana, Montana, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Texas, Vermont, Washington, Wyoming and Saskatchewan, Canada—22,413 cases; 46 cases per 100,000 population.

Prevalence of smallpox in 15 states bordering the Atlantic Ocean and the District of Columbia during the year 1931: Total cases 1,063; 2 cases per 100,000 population.

The states just mentioned are, by and large, those in which there is not general acceptance of the value of vaccination and revaccination as preventive measures against smallpox. To appreciate fully the significance of the figures cited above, it is necessary merely to compare them with those of a group of 15 states in which vaccination is the general practice, namely, the states along the Atlantic Seaboard. The population of these 15 states is approximately that of the first group of 19, that is 48,900,000 against 48,711,000. And yet there were only 1,063 smallpox cases reported in these Atlantic Coast States as against 22,413 in the central and western group. The case-incidence rate in these Eastern Seaboard States is only two per 100,000, as against 46 per 100,000 in the central and western group. Comparing the three Pacific Coast States with those on the Atlantic Seaboard, it is found that there were reported more than three times as many cases of smallpox (3,421) in the former area as in the latter (1,063), although the population of the Pacific States is only one-sixth that of the Atlantic States. In fact, there were more smallpox cases (1,112) in the single State of Washington, with a population of but 1,589,000, than occurred among the 48,900,000 inhabitants of the whole Atlantic Coast.

These findings reflect the fuller appreciation and more general acceptance of vaccination as a preventive against smallpox among the population of the Eastern Seaboard. If, for example, the same conditions had existed in the Atlantic Coast area as prevailed to cause the high case-rate of 133 per 100,000 in Kansas, there would have occurred over 65,000 cases of smallpox in these states instead of the 1,063 cases actually recorded.

It is hard to realize that in this day, with our knowledge of the ease with which smallpox can be controlled, there are communities like Helena, Arkansas; Fort Scott, Kansas, and Bennington, Vermont, where one out of every hundred of the population has been infected with smallpox during a single year. What this means can best be understood by supposing the same case-rate that was reported for Fort Scott, Kansas, to have prevailed in the City of New York. In that case, there would have occurred in 1931 at least 85,000 cases of smallpox in New York. Actually only one case was reported in the metropolis during that year.

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[*] Excerpt from Statistical Bulletin, Metropolitan Life Insurance Company, May, 1932. An indictment of communities having lax vaccination laws.—Ed.

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BASAL ANESTHETICS: A BRIEF CONSIDERATION OF THEIR EFFECTS AND COMPARATIVE SAFETY*

JOSEPH B. BOGAN, M.D.
Washington, D. C.

A basal anesthetic is a drug which, when properly applied, produces a foundation state achieving more or less of comfort to the patient, quietude, somnolence, hypnosis, analgesia and amnesia. With different drugs, different modes of administration and varying subjects, certain of the attributes of this foundation state may be emphasized intentionally or unintentionally, but the attainment of surgical anesthesia by one of these drugs solely should be an accident, never the purpose of the administration. Since the harmlessness of an anesthetic drug stands in close relationship to its ease of control in rendering the patient insensitive to operative pain and the surety of regulating its action at will, therefore the use of any of these drugs in sufficient dosage to insure complete surgical anesthesia is unsafe.

In spite of the fact that the use of these drugs presents to the patient an induction devoid of unpleasantness and alleviates the immediate postoperative symptoms, the potentiality of these drugs to produce temporary or permanent harm to the patient must be carefully studied. Much experimental laboratory and clinical work has been done with these drugs and much information obtained of their actions; and recently additional facts have been presented tending to show somewhat of their effects on blood sugar, inorganic blood phosphorus content and urinary phosphates, acidosis as measured by the carbon dioxide combining power of the plasma, and the effect on liver function.

Much data obtainable are not of great value, except as indicating tendencies, since it has been definitely shown by some investigators that the ultimate effects of these drugs are greatly modified by the methods and types of additional anesthesia. Until these results have been properly classified exact conclusions cannot be drawn. However, several groups of investigators have recently brought forth facts in regard to the action of these drugs which may be of value in revealing their ultimate safety.

The drugs at present used as basal anesthetics are avertin, and a number of the barbituric acid derivatives, as dial, allonal, luminal, amytal, barbital, pernocton, phanodorn, neonal and pentobarbital, but it must not be forgotten that attempts to use other drugs in this way have formerly been made, namely, morphine, morphine and scopolamine, magnesium sulphate, paraldehyde and others. Morphine continues to be a most valuable drug in this regard, and morphine has an advantage which few other of these drugs possess, namely, the possibility of retaining the cooperation of the patient. The recent discovery that the levulo-rotary scopolamine has more definitely desirable effects than the dextro-rotary scopolamine may result in the much wider use of this drug in the future; and it is of general knowledge that paraldehyde has been and continues to be acceptably employed rectally as a basal narcotic, particularly in young children.

My purpose now is to compare in certain respects the actions of avertin and the barbiturates in the light of some more recent laboratory and clinical studies. Although each of these drugs may be administered intravenously, orally or rectally, each adapts itself more readily to a single mode, avertin to the rectal, pernocton to the intravenous, and the other barbiturates to the oral. Whatever the mode of entrance into the body, their absorption is usually quite prompt with early effect on the nervous system. Each of these drugs is probably detoxicated in the liver with the formation of compounds which have apparently no narcotic action, so that their potential toxicity depends more on the ability of the liver to perform the detoxication rather than on the ability of the kidneys to eliminate the decomposition products. Apparently detoxication occurs just as rapidly after gross surgical procedures as after slight ones.

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* Read at the Annual Meeting of the Society, May 4, 1932.

Average doses of avertin or sodium amytal have shown slight and transient depression of liver function in dogs without signs of delayed liver damage and in man without dye retention after 24 hours (Bourne et al.). Emge and Hoffman state that after the use of sodium amytal dye excretion is so slightly affected that it may be disregarded. It may be well to recall in this connection that after one-half hour of chloroform administration the liver may show damage for eight days, and that after the use of ether liver function is definitely depressed for over 24 hours (Bourne, Rosenthal and Bourne).

In regard to the secretion and composition of urine (Bourne et al.) avertin apparently depresses kidney function more than sodium amytal, but the depression under either is temporary and there is recovery in four to six hours. Both drugs cause increased output of phosphoric acid which is probably associated with acidosis. Likewise, in spite of the relatively great fluid intake after sodium amytal (Emge and Hoffman) the urinary output is actually and relatively decreased on the day of operation, but not sufficiently to be a potential danger. In other words this apparent depression does not constitute a menace to the patient's safety.

Bourne et al. found both sodium amytal and avertin to cause slight increase of the blood bicarbonate with a slower return to normal in subjects under sodium amytal and a production of a mild acidosis with both drugs. Koehler et al. showed that anesthesia with anoxemia produces greater degrees of acidosis than when oxygen is fully supplied. Hence we cannot escape the conclusion that the prevention of even slight degrees of suboxygenation may be a potent factor in the welfare of these cases. The changes in the blood sugar and in the carbon dioxide combining power of the plasma seem to vary markedly according to the methods used·to achieve complete surgical anesthesia.

Pertinent to the consideration of blood changes with basal anesthetics may be the findings of Widenhorn which he detailed before the fall session of the International Anesthesia Research Society. By several series of careful experiments he found that under avertin without the addition of inhalation anesthesia, the blood sugar was definitely increased and that from 48 to 72 hours were required for the return to normal. Avertin with the addition of "drop ether" caused practically the same blood change. In another series avertin with nitrous-oxide-oxygen was given and a smaller increase of blood sugar was shown with a still more prompt return to normal. In another series in which avertin was used with ethylene-oxygen the results were still more surprising; there was practically no change in the blood sugar. Similar observations of the changes in the carbon dioxide combining power of the plasma showed a similar modification of the findings, namely, that whereas with avertin alone the change was marked, with avertin-ethylene-oxygen or with avertin-nitrous-oxide-oxygen the change was negligible.

From this report we must deduce that with avertin basal anesthesia the patient's welfare is definitely safeguarded by the administration of a moderate, non-depressant dose of the basal drug and by the combination therewith of a properly administered inhalation anesthetic by the closed method.

Barlow and co-workers have made an attempt by conscientious experimental work to classify avertin and several barbituric acid derivatives in regard to relative toxicity, hypnotic efficiency, and premedication efficiency. Comparing the minimal fatal dose with the minimal effective therapeutic dose they evolved the following order of toxicity: (1) Pentobarbital 1:3.3, (2) Avertin, (3) Dial, (4) Allonal, (5) Neonal, (6) Phanodorn 1:2.6, (7) Amytal 1:2.2, (8) Luminal, (9) Barbital, (10) Pernocton 1:2.

Having by a number of experiments decided the smallest dose required to produce complete hypnosis and comparing this with the minimal fatal dose of the drug, they present the following order of hypnotic efficiency: (1) Pentobarbital, (2) Dial, (3) Allonal, (4) Neonal, (5) Avertin, (6) Phanodorn, (7) Pernocton, (8) Amytal, (9) Luminal, (10) Barbital.

These workers next endeavored to classify these drugs as to their premedication efficiency by combining their administration with nitrous-oxide-oxygen and basing their classification on (a) ratio of effective dose to lethal (fatal) dose, (b) minimal duration of hypnosis to complete recovery and (c) occurrence of disagreeable side actions. Their classification is as follows: (1) Pentobarbital, (2) Avertin, (3) Dial, (4) Allonal, (5) Neonal, (6) Phanodorn, (7) Amytal, (8) Luminal, (9) Barbital, (10) Pernocton.

From the foregoing summary the following several facts should be emphasized: (a) The dependence of the patient on the efficiency of liver function for the prompt detoxication of these basal anesthetics; (b) the apparent absence of any but temporary interference with the vital functions when properly administered in moderate dose; (c) the deleterious effect on these patients of suboxygenation; (d) the definite advantage to patient under avertin of the addition of inhalation anesthesia by the closed method; and finally (e) the importance of consideration of the relative toxicity and the relative efficiency of these drugs not only when employing them as basal anesthetics but in other therapy as well.

Now, is this basal anesthesia worth while? Do the advantages that accrue from this method compensate for the addition of another complication to the already complex modern anesthesia? From the patient's standpoint alone we may agree that it is well worth while. For the patient to acquire a period of somnolence and amnesia which begins in his bedroom and is not concluded until sometime after his return to his room, is a God-send, especially to the mentally or nervously unstable.

In conjunction with my associate, Dr. H. W. Kearney, I have given upward of 1,000 avertin basal anesthesias, about 40 pernocton, and lesser numbers of pentobarbital, sodium amytal and luminal. With this opportunity to compare we feel that, if some form of basal anesthesia is indicated, the results with avertin are more generally agreeable and safer for the patient, it is productive of a more coöperative form of anesthesia for the surgeon, and though requiring more time it provides a smoother and more easily managed anesthesia for the anesthetist.

Pernocton is usually given intravenously, the other barbiturates by mouth, and avertin by rectum. Extreme care should be used in the intravenous administration of any narcotic, and the patient should be watched closely for any suddenly developing depression and the onset of sleep. Not more than one cubic centimeter should be given per minute, and when deep sleep appears the administration should cease even though the total intended dose has not been given. The disapproval by the American Medical Association Council on Pharmacy and Chemistry of the intravenous use of the barbiturate is, I believe, well founded, and this method should be reserved for selected cases.

The mode of administration of avertin is simple, seldom objected to, and is hedged about by ample precautions for safety; the absorption is rapid and the fluid is seldom expelled before definite effect has been obtained. Even if sleep is not induced, comfortable sedation is the rule, and though the patient may not be coöperative he is usually not obstructive. Occasional excitation occurs in the avertin case, exhibited usually by extreme talkativeness. We have seen excitement more frequently in the barbiturate cases, exhibited usually in movements of the body and limbs, sudden and hard to control, and this state usually necessitates the earlier application of deeper inhalation anesthesia than in the avertin case.

Inhalation anesthesia is usually applied and reapplied to the avertin basal case with generally no excitement or objections on the part of the patient. After addition of sufficient inhalation anesthetic for the beginning of the operation little difference is seen between the avertin and the barbiturate cases save perhaps the production of better relaxation in the avertin cases with the exhibition of less potent inhalation anesthetic.

Avertin and the barbiturates both cause a moderate primary fall in blood pressure and a slight decrease in respiratory amplitude, but with the exhibition of moderate doses, especially indicated in the debilitated and the obese, such depression should not be sufficient to cause alarm. Profuse sweating and chilliness are seldom seen. Likewise, proper dosage and proper care should guard against the occurrence of cyanosis. Otherwise the incidence of complications should differ not at all from that under other forms of anesthesia.

The combination of basal anesthesia with novocaine infiltration, nerve block, or caudal or intraspinal anesthesia has definite drawbacks, the chief being (1) the tendency of basal anesthesia to lower blood pressure and depress respiration, whence its combination with intraspinal or caudal anesthesia is unwise, and (2) the possibility of unexpected and sudden movements on the part of the patient in response to stimulus of pressure or heat even though pain sensation has been adequately blocked. If such combination is decided on in selected cases facilities should always be at hand for the administration of oxygen, CO_2, or some form of inhalation anesthesia if needed.

These drugs exert their maximum effect over a period of from one to three hours, the usual duration being about one and a half hours. This period is followed by somnolence lasting from 4 to 12 hours. The pentobarbital patient is an exception, being awake and oriented in from one to two hours after the operation. The period of amnesia usually begins promptly with the administration of the drug and continuues from 6 to 24 hours. The postoperative period is usually smooth and the awakening uncomplicated by nausea or vomiting.

Bevan's recent observations on present-day anesthesia should give us pause and remind us that, in spite of the increasing popularity of basal anesthesia, gas-oxygen with adequate preoperative morphinization and with or without the addition of ether still presents a method comparatively safe, sane and efficient. We need not expect the universal adoption of basal anesthesia nor that it will soon replace most other methods; but we see in it a safe and efficient addition to the armamentarium of the anesthetist, welcomed by the surgeon to be used occasionally or frequently according to his predilection, and thrice welcomed by the patient as substituting for the so frequently dreaded induction and the generally distressing aftermath a soothing somnolence and a comfortable recovery.

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HEART FAILURE DUE TO TRAUMATIC FEMORAL ARTERIOVENOUS FISTULA CURED BY OPERATION*

Report of a Case

Fred R. Sanderson, M.D.

Associate Professor of Clinical Surgery, Georgetown University School of Medicine

AND

William S. Murphy, M.D.,

Washington, D. C.

The occurrence of a communication between the arterial and venous channels, whether directly (aneurysmal varix) or indirectly through an adventitious tract or sac (varicose aneurysm) results in an immediate disturbance of the hydraulics and physiology of the vascular circulation. When the opening between the artery and vein is of sufficient size the changes in the circulation are so profound that there results chronic invalidism, cardiac failure and even death. A small opening causes no general effects, the symptoms being entirely local.

The clinical features of the local effects of arteriovenous aneurysm and their difference from true arterial aneurysm were described by William Hunter in 1759; but it has been only since the World War with its great number of vascular wounds from explosive shells and machine gun bullets that the systemic or vascular effects of arteriovenous aneurysm have been recognized and understood. For this knowledge we are indebted to the investigations of Halsted, Matas, Reid, Holman, Makin, Hoover, and Beams, Lewis and Drury. Although all of these observers do not agree on some of the changes occurring in the vascular system in arteriovenous fistula, they have contributed greatly to our knowledge of the hydraulics and pathologic physiology of the circulation of the blood.

As keen an observer as was Sir William Osler, it is stated that he failed to appreciate the effects of arteriovenous aneurysm on the circulation and advised against operation in the presence of symptoms of cardiac decompensation. In 1920 Callender analyzed 447 cases of arteriovenous fistula collected from the literature and in 1928 Pemberton reported 41 cases of aneurysm of which 25 were arteriovenous. Yater, the same year, reporting several cases, found that the oxygen content of the blood taken from the vein in the region of the fistula revealed the presence of arterial blood and suggested the test as a pathognomonic criterion in all cases in which there is doubt as to the presence of an arteriovenous communication.

Two types of arteriovenous fistula are recognized, acquired and congenital, of which the latter is much less frequent. In Callender's large series there were only three cases of the congenital type, while in Pemberton's there were nine cases. The condition is present from birth and manifests itself early when present in a limb, which actually grows to a length greater than the normal limb. Ulceration and gangrene are frequently present. Little can be accomplished surgically, as it has been frequently shown that the communications between the artery and vein are multiple. Amputation of the affected limb has been necessary in some cases.

Trauma is the usual cause of the acquired type of fistula. Bullets, pieces of shell, stab wounds, venesections, contusions and fractures are the most common causes.

Locally, the effects of a fistula result in marked dilatation of the artery and vein involved. In the artery the dilatation is proximal, while in the vein the dilatation extends above and below the opening. The artery becomes elongated and thin-walled, and degenerative changes take place. The increased pressure in the vein causes it to expand and hypertrophy, resulting in incontinence of the valves, and the superficial veins become enlarged, tortuous and pulsate. The surface temperature in the region of the fistula is increased, that distal is diminished. The size of the leg is increased, and in the congenital type the limb is several centimeters longer than the normal one. Blood removed from a vein in the region of the fistula shows a high oxygen content, well above 70 per cent. Trophic changes below the opening are prone to occur, chronic ulcers and even gangrene resulting. In the region of the fistula there is a continuous bruit and thrill throughout the cardiac cycle, with a systolic intensification, greatest at the site of the fistula. Weakness and numbness may be present in the affected limb, associated with a sensation of weight.

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Systemic changes in the circulation do not occur in every case of arteriovenous fistula, their presence or absence depending on several factors, chief of which, as pointed out by Matas, are: (1) The size of the fistula, (2) the volume and force of the short-circuited arterial stream, (3) the caliber of the vessels involved, (4) the proximity of these to the heart, (5) the duration of the fistula, (6) the age of the patient, (7) the coexistence of previous cardiovascular disease.

Holman, by extensive experimental work in dogs, concluded that the chief factors that are responsible for the systemic changes are the size of the opening and the unobstructed return flow to the heart. The larger the opening and the longer the duration, the more likely cardiovascular changes will take place. The systemic changes occurring in large fistulae are: (1) Enlargement of the heart, (2) increased heart rate, (3) low diastolic pressure with a high pulse pressure, (4) changes in the pulse and blood pressure from temporary occlusion of the fistula, (5) the presence of cardiac murmurs, (6) capillary pulse, (7) high blood pressure in the leg as compared to that in the arm, (8) increased respiratory rate on exertion, diminished vital capacity and diminished voluntary control of respiration.

Holman's explanation of the causes of the circulatory disturbances are convincing, although other authorities disagree. By experimental work he has shown that when a large amount of blood is shunted from the normal system of heart, arteries, capillaries and veins into an abnormal one of heart, arteries, fistula and veins, there is a marked decrease in the peripheral resistance, with lowering of the systemic pressure and an increase in the venous pressure. In order to maintain sufficient oxygenation of the tissues and to overcome the large amount of blood lost through the fistula, compensatory changes must take place. The minute blood volume flow through the heart must be actually increased to accomplish this. Holman has shown that the blood volume is actually increased, the heart dilates and hypertrophies, and the heart rate increases.

This is not in accord with the clinical and experimental studies of Lewis and Drury. They maintain there is no increase in the venous pressure and explain that the increased flow of blood in the veins "is compensated by a less rapid escape of blood from the capillaries generally, the mean arterial pressure being reduced." Also, the intake and output of the heart remains normal or even below normal, and the work of the heart is not increased. They account for the enlargement of the heart, which is primarily a dilatation, to a deficiency in nutrition of the heart muscle consequent on the fall of mean arterial pressure.

Clinically, the cardiovascular changes are shown by the increase in the pulse rate, enlargement of the heart, a normal or increased systolic pressure with a low diastolic pressure, resulting in a high pulse pressure. The blood pressure in the limb distal to the fistula is lower than that of the other. The pulse is forceful and a capillary pulse is frequently present.

Branham's bradycardiac sign is always present and is considered pathognomonic. He observed that when the fistula is occluded by digital pressure over the opening or by compressing the artery proximal to the fistula, there is an immediate slowing of the heart rate associated with a rise in both the systolic and diastolic pressure, the latter showing the greater rise. Following repair of the fistula the blood pressure returns to normal and the heart diminishes in size.

The circulatory changes may exist for months or years with adequate compensation before evidences of cardiac failure appear. In the case here reported failure of compensation occurred within a few months. A most striking recovery from complete cardiac insufficiency and decompensation may occur after successful surgical removal of the fistula. Reid reports a case of four years duration in which there was generalized edema of the extremities, ascites requiring several tappings with removal of as much as 18 liters of fluid, and a large fibrillating heart. Following operation recovery was rapid and the man was able to resume work within a few months.

The diagnosis is made by the presence of the characteristic bruit and thrill continuous throughout the cardiac cycle, with systolic intensification. Arterial aneurysms rarely cause as marked local disturbances. The murmur is not constant but is intermittent. The thrill is rarely as marked. When there is doubt as to the condition present a small amount of blood can be withdrawn from a vein in the affected region in order to determine the oxygen content, which is always high in arteriovenous fistula.

The treatment of arteriovenous fistula is directed toward the permanent closure of the fistula and the restoration of the lumen of both the artery and vein. This is not always possible and it may become necessary to completely extirpate the segments of the involved vessels including the fistula. The method employed depends upon the type of fistula, its situation, the amount of dissection necessary to expose the lesion and the efficiency of the collateral circulation. Ligation alone of the proximal artery in the treatment of arteriovenous fistula should never be done except when the lesion is intracranial. Makin has pointed out that gangrene is more liable to follow when the artery alone is ligated, and if the artery must be sacrificed simultaneous ligation of the vein is imperative.

In the congenital type attempts at closing the fistula or of excising the fistulous vessels have not been successful. Pemberton reported three cases involving the limbs in which the vessels were removed in the area of the maximal thrill. In every case there was interference with the blood supply so that amputation of the limb was necessary. Subsequent dissection and radiologic examination of the injected vessels showed that multiple fistulae between the arteries and veins existed throughout the limb in each of the cases. However, in superficial cirsoid aneurysm ligation and excision of the mass of dilated vessels is successful.

In the acquired type of fistula the opening is usually single, and therefore its eradication is not so difficult. The adequacy of the collateral circulation should be determined before any operative procedure is done. Periodic compression of the vessels to be ligated, as advised by Matas, not only tests the efficiency of the collateral circulation but hastens its establishment. According to Reid the best stimulus for the establishment of an adequate collateral circulation is the presence of the fistula. He has shown that the embarrassment to the circulation is much greater in fistula than that due to occlusion of the artery, and consequently the cause of a much more prodigious development of the collateral circulation. For this reason it is advisable to delay operation three to six months, provided local and cardiac conditions permit.

The most satisfactory operation in arteriovenous aneurysm is segmental excision of the artery and vein including the fistula. The risk is small provided adequate circulation is established. However, the extensive dissection which at times is necessary for the mobilization of the vessels before excision, may result in the tying of important collateral vessels encountered in the dissected area. Ligation, with silk, of the artery and vein proximal and distal to the fistula can readily be done in many cases but may be unsuccessful on account of the sutures cutting through the vessels with complete union of the ends and the re-establishment of the fistula.

Ligation of the fistulous tract may be done when it is possible to mobilize and free the communicating tract.

Direct procedures on the fistula by closure of the opening and restoration of the lumen of the vessels should be done if there be doubt as to the adequacy of collateral circulation. This type of operation is more difficult in inexperienced hands, and leakage of the suture line with secondary hemorrhage may occur. Closure of the fistula may be accomplished by suturing the opening after exposing it by an incision in the vein opposite the fistula. The lumen of the vein is then re-established by closing the incision made in its wall. When a fistulous tract exists, the tract may be divided and the openings in the artery and veins closed with silk. In the presence of a sac, as in varicose aneurysm, closure of the openings in the artery and vein may be accomplished through the sac by the Matas principle of endoaneurysmorraphy. In the treatment of aneurysmal varix Bickham originally suggested the suturing of the fistulous opening in the artery transversely through an incision in the vein, and reinforcing the closure by approximating the adjacent wall of the vein over it. The vein is then ligated proximally and distally to the site of the fistula.

Proximal ligation of the internal carotid artery in cases of pulsating exophthalmos, in which the fistula exists between the cavernous sinus and the internal carotid artery, is successful in many cases. Testing of the collateral circulation by digital compression of the carotid should always be done. In cases of extreme exophthalmos with marked ophthalmoplegia, to delay operation long enough to allow the establishment of collateral circulation may result in the loss of sight of the eye. On the other hand, ligation of the carotid may result in hemiplegia and death of the patient. Under such circumstances Reid advises the use of the Matas-Allen band to occlude the carotid instead of ligation. If cerebral symptoms ensue, the band can be removed and the artery will be undamaged.

REPORT OF CASE

The patient, a grocery clerk, aged 49 years, was admitted to Georgetown University Hospital on August 20, 1931, complaining of shortness of breath and swelling of both legs. The family history was irrelevant. He had had spinal meningitis in 1898 and pneumonia and empyema with operation in 1911. On February 28, 1931, he was shot in the right thigh and treated at Georgetown University Hospital, where the bullet was removed. He remained in the hospital three days. On returning to work following operation he noticed slight swelling in the right foot and some pain in the leg after standing for long periods; also, there was some shortness of breath on exertion. About one month before admission both feet had become swollen and the shortness of breath was more marked. In the last two weeks the breathing at night had become so difficult that it was necessary for him to prop himself up on several pillows in order to obtain relief. There was an associated productive cough. On exertion there was a dull, boring pain in the chest and a sensation of numbness and weight in the legs. Examination revealed a middle-aged man resting in bed on pillows, with a moderate amount of dyspnea and some cyanosis of the lips, face and neck. Pulsation of the vessels of the neck was prominent, forceful and rapid. Examination of the chest revealed scattered râles over both bases. The heart was rapid, and markedly enlarged. It measured 13 cm. across the base and 21½ cm. at the apex, 8 cm. to the right of the midsternal line and 13½ cm. to the left. The pulmonic second sound was markedly accentuated, and the aortic second sound was louder than the first sounds. The liver was enlarged about two inches below the right costal margin. There was no ascites. Examination of the legs showed both edematous, the right leg larger than the left. On the anterior inner surface of the right thigh about six inches below the pubic spine, there was a round scar one-half inch in diameter. There was a second scar on the outer posterior surface of the thigh about six inches below the crest of the ilium. A marked thrill and bruit were present and extended from the middle of the thigh upwards, disappearing above Poupart's ligament. Both were continuous, with a maximum intensity during systole. The point of maximum intensity was about 2 cm. above the anterior scar. On pressure of the vessels above the scar there was an immediate slowing of the pulse from 100 to 60 (Branham's bradycardic sign). There were several enlarged tortuous veins in the leg. The blood pressure in the right arm was 120/65, in the left arm 115/70, and in the left leg 200/100. Diagnosis of acquired arteriovenous fistula with consequent congestive heart failure was made by Dr. Wallace M. Yater, on whose service the patient was studied. The patient was kept in bed for ten days and digitalized, during which time there was marked improvement in his condition. The pulse slowed down to about normal, breathing improved and the edema became less. The size of the heart also diminished, so that after one week the lower border measured 19 cm., 7 cm. to the right and 12 cm. to left of the midsternal line. After the ten days the patient asked to go home and promised to stay in bed. Instead he worked in his store and was readmitted to the hospital one week later for operation, not much the worse from his holiday. On September 9, 1931, under gas-avertin anesthesia, an incision about eight inches long was made along the course of the femoral vessels over the pulsating area. Dissection was slow and difficult on account of scar tissue. Finally, the vessels were exposed for a distance of three inches above and one inch below the possible site of the fistula. Both the vein and artery were markedly dilated above the fistula, their diameter measuring 4 cm. Below the fistula the vessels were enlarged but returned to normal size within an inch of the fistula. Both vessels were mobilized above and below the fistula, clamped, and a segment of both artery and vein removed, including the fistula. The cut ends were tied doubly with fishing line. During anesthesia the blood pressure was 108/58, the pulse 120. Immediately after excision the blood pressure was 134/74, the pulse 110. Convalescence was uneventful. The circulation in the right leg was good, being warmer even than the left. Gradually the measurements of the heart diminished so that when the patient walked out of the hospital one week after operation the lower border measured 14 cm., the blood pressure was 120/70, the pulse 66. On October 7, 1931, three weeks after discharge from the hospital, the patient returned for examination with no complaints. There was no edema nor dyspnea. The heart was normal in size as checked by fluoroscopic examination. It measured at the base 6½ cm., and the lower border was 13½ cm. The sounds were normal and there were no murmurs. The pulse rate was 84. The blood pressure in each arm was 110/70, and in the right leg 120/90. The liver was not palpable. The right leg was the same size as the left and edema was not present. The right leg was warmer than the left. There were many dilated veins in the right leg below the knee.

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THE VACCINE TREATMENT OF THROMBO-ANGIITIS OBLITERANS*

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Thrombo-angiitis obliterans, variously known as Buerger's disease, presenile gangrene, juvenile gangrene and other names less accurately descriptive, first emerged from comparative obscurity with Buerger's report in 1908. General interest has enjoyed marked acceleration in the past ten years.

The etiology of the disease remains unsolved, but there are a few factors so constantly associated with it that they seem inseparable. It is practially limited to males between the ages of 25 and 50. Cases reported in females almost without exception lack pathologic substantiation. Smoking is almost universal among its victims. Approximately 80 per cent of the male population consumes tobacco. The increase in the use of tobacco and the possible increased incidence of the disease may bear relationship, although this far from explains its continued rarity among females. Contrary to previous beliefs the disease seems to be equally divided among the races and occupations. A large percentage of cases shows foci of infection, which together with the inflammatory appearance of the lesions in the blood vessels seems to point to an infectious or bacterial toxic foundation as the etiologic factor.

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Pathologically the disease is essentially of a chronic inflammatory nature, affecting chiefly the larger arteries and veins of the lower extremities. Upper extremity involvement is next in order of frequency, and cases of involvement of the cerebral, coronary, mesenteric and spermatic vessels have been reported. Taube recently collected twenty-six such cases from the literature and reported two cases of his own. Early in the disease the adventitia becomes thickened and infiltrated with lymphocytes. The intima proliferates, the cells assume a radial arrangement and a thrombus fills the lumen of the vessel. The vasa vasorum undergo similar changes and new vasa vasorum penetrate all coats of the vessel and the thrombus as it undergoes organization. Changes in the nerves of the part are secondary to and dependent upon the changes in the arteries. The earliest manifestation of the disease may be superficial phlebitis. It is usually migratory and recurrent and may be present for years before arterial occlusion becomes sufficient to cause anoxemia. Involvement of a vein may vary from the smallest palpable subcutaneous nodosity to thrombosis throughout its entire extent.

The earliest symptom is usually fatigue of one or both lower extremities, followed by claudication. Later, color changes, numbness, burning and coldness are noticed. As arterial occlusion advances trophic changes appear. Pain, when the patient is at rest, is a distinct type of pain which accompanies trophic changes. It is usually limited to one or more digits and is thought to mark the approach of tissue death.

Vascular involvement and consequently tissue damage and symptoms vary so that the indications for treatment are not clearcut. Cases require highly individualized study before the type of treatment can be selected. High and early amputation has been replaced in the last ten years, in selected cases, by low amputation, lumbar ganglionectomy and medical and physical measures. The type of treatment depends somewhat upon the economic status of the patient. Medical treatment is prolonged, but may prevent ultimate amputation or high amputation. The chronic nature of the disease and its occurrence during the period of maximal earning capacity combine to make it one of the most expensive.

Methods of treatment have varied with individual theories of etiology. Steel thought the coagulation time of the blood was shortened, and he suggested the intravenous injection of sodium citrate. Others believed the viscosity of the blood was increased and used Ringer's solution. The methods in favor at the present time are lumbar ganglionectomy, triple typhoid vaccine given intravenously and the physical measures, as postural exercises, radiant heat and contrast baths.

Diminished circulation predisposes the extremities to complications from trauma and low temperature. The paring of corns, removal of toe nails and like surgical procedures have resulted in the initiation of gangrene. Smoking should be limited or stopped altogether. An occupation requiring the least walking is of first importance. Symptoms of near arterial occlusion may follow excessive exercise or exposure to extreme cold over a long period. Theoretically the arteries are in a state of partial spasm or at least normal tonus. The earliest surgical attempt to overcome this factor was periarterial sympathectomy. Results of this procedure were unsatisfactory. Royle, in 1924, devised the surgical procedure known as lumbar sympathectomy for relief of spastic disturbances of the extremities. Adson later adopted the abdominal route and removed the second, third and fourth lumbar sympathetic ganglia and their connecting rami. Following this procedure it was noted that the extremities were warmer and remained so, as shown by skin temperature and calorimetric tests. The rationale of applying this procedure to the treatment of thromboangiitis obliterans followed Brown's observation that there is a vasoconstrictor factor similar to that in Raynaud's disease. The selection of cases suitable for lumbar sympathectomy rests upon the ability to demonstrate adequate vasodilation during systemic fever.

Postural exercises consist of alternately elevating the extremities perpendicularly to the bed and hanging them over the edge of the bed for prescribed lengths of time. Contrast baths are accomplished by alternately immersing the extremities in warm and cold water. Radiant heat is furnished by carbon filament bulbs arranged in an arch fitting over the extremity.

Radium chloride given intravenously occasionally relieves pain. It produces no systemic reaction or vasodilation. Its action is not understood.

In Paris, Villaret and Justin-Besancon, and in the United States, Waters, have reported the use of acetylcholine hydrochloride. It appears to produce all the desired effects obtained by the use of foreign protein and is fraught with none of its unpleasantness or danger.

Foreign protein therapy was first suggested by Goodman and Gottesman (1923). Its merit has become widely recognized. In a series of 150 cases reported by Barker it was found of value in 76 per cent. The objects sought are the relief of pain and improvement of circulation. The pain of claudication and rest pain can be most intense. No pain is more destructive to nervous and psychic equilibrium. Patients beg for amputation or vaccine if it has been given in previous attacks. The relief of pain with vaccine is sometimes spectacular. Often pain ceases with the first injection. Improvement of the circulation occurs with the onset of fever. The degree of improvement is indicative of the size of the vascular bed remaining patent. Relief from pain and general improvement may continue after all demonstrable vasodilation has disappeared. The explanation for this is not clear.

Triple typhoid vaccine is given in initial doses of from 25 to 50 million bacilli intravenously. As tolerance is acquired the dose must be increased to produce a satisfactory febrile reaction. As many as 500 million have been given at one time. An hour or two after receiving the vaccine the patient experiences headache, nausea and achy sensations in the joints and muscles, followed by a marked chill. With the onset of fever the unpleasant symptoms disappear and the patient is more comfortable. He may observe a gratifying sense of warmth in the affected extremities because of their previous subnormal temperature.

Some borderline cases of trophic gangrene can be saved amputation, and in others the level of amputation can be lowered. Foreign protein therapy should be tried prior to the amputation of extremities with moderate gangrenous changes. The chill phase of foreign protein reactions is undesirable and slightly conducive to thrombosis, but such occurrence is rare. When satisfactory vasomotor response is produced, treatment may be given as often as every other day or only once a week. When prolonged treatment is necessary a rest of a month is advisable between courses of from 12 to 16 injections.

The patient who is suitable for this type of therapy will probably be without pain and his trophic changes will disappear. He may be able to resume his occupation and lead a comfortable if sedentary life. Occasional courses of treatment are advisable even in the absence of evidence of progression of the disease. The result sought is the establishment of sufficient collateral circulation to care for the needs of the extremity. This may be accomplished even with complete occlusion of all the larger arteries.

The degree of vasodilation and consequently increased blood volume in the extremity during systemic fever can be determined calorimetrically. A formula has been devised by which the "vasomotor index" can be determined. It is arrived at by subtracting the rise in mouth temperature from the rise in the skin temperature of the affected extremities and dividing the result by the rise in mouth temperature. Indexes in different individuals vary from 0 to 6.5. A "0" index shows no available vasodilation.

SUMMARY

Cases of thrombo-angiitis obliterans, except those with advanced gangrene, are benefited by treatment with foreign protein. In cases with advanced gangrene the level of amputation may be lowered.

The degree of available vasodilation can be determined by skin temperature tests.

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PNEUMOCOCCUS MENINGITIS OCCURRING IN A TWO-DAY OLD INFANT*

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INCIDENCE

Meningitis in the newborn (3 weeks of age or less) appears to be a relatively rare condition. In 1928 Smith collected 21 cases from the literature occurring during the first 14 days of life. The authors have collected 9 additional cases, one of them occurring on the sixteenth day, and are reporting the thirty-first case. Table I gives data concerning these 31 cases.

BACTERIOLOGY

The bacteria responsible for meningeal infections in the newborn are listed in Table II.

ETIOLOGY

In a number of cases there was nothing in the histories of parents or offspring which would account for the resulting infections. In several cases there was a definite history of respiratory infection in the mother, and in one case of meningococcus meningitis the mother was found to be a carrier of the organism. A birth injury may possibly have been a source of infection in Smith's case. While the source of infection cannot be given with certainty in those having meningitis due to *B. coli*, it would seem that the induction of labor or the contamination of the birth canal with material from the bowel were the most likely sources. In one case the insertion of the finger of an attendant into the mouth of the infant in an effort to induce respiration may have been a factor in causing the infection.

SYMPTOMS AND SIGNS

Fever and generalized convulsions were most frequently noted. Irritability, muscle spasm, nystagmus, cyanosis and dyspnea were less frequently reported. Bulging of the fontanel was not a common observation. Due to the incompletely developed nervous system in the newborn the usual signs of meningitis, viz., Kernig's sign, opisthotonus, rigid neck and vomiting were inconstant and but occasionally found.

DIAGNOSIS

It was with some difficulty that the correct diagnoses were arrived at, the most common preliminary diagnoses being intracranial hemorrhage and tetany. While a number of authors make no mention of the diagnostic difficulties encountered, our personal observations and the reports of others would indicate that meningitis in the newborn is frequently diagnosed improperly or recognized with difficulty. It is well to follow the advice of Netter in connection with the diagnosis of meningitis in infants, viz., "Think of meningitis and do a lumbar puncture in every infant sick without apparent cause."

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* From the Pathological Laboratory, Garfield Memorial Hospital, Washington, D. C. Read before the Society, May 11, 1932.

TABLE I

AUTHOR	DATE	AGE-DAYS	ORGANISM
Collected by Smith			
Hinsdale	1889	3	B. coli
Sherer	1891	8	B. coli
Sherer	1891	9	B. coli
Shieb	1900	8	B. lactis aerogenes
Goldreich	1902	1	B. coli
Noeggeroth	1907	11	B. coli
Benfey	1907	7	B. pyocyaneus
Holt	1911	Newborn (6 cases)	Streptococcus and staphylococcus
Bonhoff and Esch	1912	6	B. mucosus capsulatus
Koplik	1916	Newborn	Meningococcus
Koplik	1916	4	Pneumococcus
Koplik	1916	1	B. coli
Barron	1918	11	B. coli
L'Esperance	1920	3	Pneumococcus
Row and Kohlbry	1924	5	B. coli
Smith	1928	5	Streptococcus
Collected by Lindsay, Rice and Selinger			
Sherman	1923	3	Bacillus of lactis aerogenes group
Rueda	1927	14	Pneumococcus
Gaucheraud and Pigeaud	1928	4	B. pyocyaneus
Heinz	1928	11	Pneumococcus
Braid	1928	3	B. coli
Uhr	1929	6	Pneumococcus
Guéniot	1930	16	Streptococcus
Mathias	1930	3	Meningococcus
Dodds	1931	6	Mixed growth
Lindsay, Rice and Selinger	1932	2	Pneumococcus

TABLE II

ORGANISMS	TIMES REPORTED
B. coli	9
Pneumococcus	6
Streptococcus and staphylococcus	6
Streptococcus	2
Meningococcus	2
Bacillus of lactis aerogenes group	2
B. pyocyaneus	2
B. mucosus capsulatus	1
Mixed growth	1

PROGNOSIS AND TREATMENT

Meningitis in the newborn is usually fatal, although Uhr reports a case of pneumococcus meningitis with recovery. Spinal or cisternal puncture and transfusion should be done in all cases and specific serum therapy used when indicated.

CASE REPORT*

The mother of the patient, a white primipara aged 32 years, was admitted to Garfield Memorial Hospital, June 14, 1927.

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* The authors are indebted to Dr. R. L. Silvester for the privilege of reporting this case.

The pregnancy had been normal and physical examination showed no abnormality. The fetus was in the left occiput anterior position. No vaginal examinations were made. Under ether anesthesia, following a left episiotomy and with the aid of low forceps an apparently normal male infant, weight 8 pounds, 10½ ounces, was delivered by Dr. R. L. Silvester 12 hours and 31 minutes after the beginning of labor Puerperium was entirely normal. The day following delivery the infant's general condition was good, he nursed well, the highest temperature being 99.4°F.; the weight was 7 pounds, 14¼ ounces. On the second day after delivery the child appeared "irritable and cross" when moved but nursed well, and the temperature remained normal (weight 7 pounds, 8 ounces). The following day irritability was still noted, temperature was normal (weight 7 pounds, 9½ ounces). On the fifth day irritability was much greater, food which was not well taken was vomited and the child cried most of the time. The temperature varied between 100.2°F. and 103.4°F. (weight 7 pounds, 12 ounces). On the sixth day there appeared to be some improvement, but the temperature varied between 100.6°F. and 101.8°F. On the seventh day vomiting of projectile type, generalized convulsions and twitchings of the facial muscles were noted, as was nystagmus, rolling of the head and cyanosis. The temperature varied between 100°F. and 101°F. (weight 7 pounds, 8 ounces). The following day cyanosis was more marked and a tentative diagnosis of intracranial hemorrhage was made. Spinal puncture was done, but no fluid was obtained. One hour and a half later a similar unsuccessful attempt was made both by spinal tap and by cisternal puncture. An intraperitoneal injection of 40 milliliters of 10 per cent dextrose solution was given. The patient had numerous convulsions until death at 11:20 p.m., 8 days after birth. Autopsy, which was limited to the head, revealed a rather diffuse mottling of the body. The fontanels did not bulge. On removal of the dura marked injection of the meningeal vessels, edema of the brain and a thick, greenish, purulent exudate over the base of the brain were found, and the foramen magnum was blocked by a blood clot which encircled the brain stem. The medulla appeared to be the seat of hemorrhage, and a number of clots were adherent to this structure. Smears from the exudate showed numerous gram positive, lancet-shaped, encapsuled diplococci, having the morphology of pneumococci. On culture this coccus was overgrown by a contaminating organism. There is little to indicate that this infection had its origin in utero inasmuch as the mother had a normal pregnancy and puerperium. The illness apparently started on the second day after birth and the infection was in all probability acquired from the secretions of the nose and throat of the mother, an attendant or other contact.

SUMMARY

1. A case of pneumococcus meningitis in a newborn infant 2 days old is reported.

2. The symptoms of meningitis in the newborn are vague and not well defined as in adults, the symptoms sometimes being suggestive of intracranial hemorrhage or tetany rather than meningitis.

3. The illness usually terminates fatally.

4. Spinal puncture should always be performed in infants with any unexplained febrile illness.

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DISCUSSION

Dr. H. H. Donnally: The most interesting thing in this case is the fact that this infant was shown at autopsy to have an extensive purulent exudate over the meninges with practically no symptoms which directed especial attention to its having meningitis with the exception of the facial muscular twitching and the generalized convulsions. These conditions were very suggestive of intracranial trouble, possibly meningitis. Doctor Rice has indicated that there was no bulging of the fontanel and none of the ordinary signs of meningitis. The child had been irritable between the second and fifth days. Irritability is hardly a definite symptom of meningitis. It was really only by the fifth day that the generalized convulsions occurred with the rise in temperature to 103°F. so that I don't feel that we can say that the symptoms of meningitis started as early as the second day. The primary character of the meningitis is questionable. There may have been a point of entrance of the infection somewhere else in the body. The diagnosis of meningitis was established only by autopsy, that is to say, there was nothing in life which determined the diagnosis, because no spinal fluid had been obtainable. Infection of the meninges was probably bloodborne. What other involvement did the child have? That question can never be answered, because the autopsy was limited to the head. We don't know the condition of the umbilicus, or the umbilical vessels. We don't know the condition of the peritoneum, of the lungs, or of the pleurae, and we do know that when there is acute pyogenic infection of the newly born, meningitis occurs in about 10 per cent. It does not seem with the diagnosis of meningitis made by autopsy limited to the head that primary meningitis can be considered as established. In fact, it seems that the indication points to this being an acute pneumococcic infection of the newly born with involvement of the meninges as a part of the picture. Under such circumstances meningitis is not rare. It is rare to have an acute pyogenic infection of the newly born in our time, but before the days of aseptic obstetrics, such infections occurred in 6 to 8 per cent of the newly born, while meningitis was present in 10 per cent of those infected. This is a very interesting case, but I don't feel that the data presented established the case as a primary meningitis, and its rarity therefore is not so striking.

Dr. P. A. McLendon: Doctor Rice's very interesting case is paralleled by one of my own, now at Children's Hospital, which he has asked me to mention. This infant, 8 days of age, was first seen by me on April 19, 1932. I was called primarily by the obstetrician to prescribe a formula, since the mother had refused to nurse the baby. The temperature was found to be 102°F. The baby was not taking her formula very well. Examination was negative and the temperature was thought to be due to dehydration. The following day the temperature was 104°F. and still no physical findings were noted. In the absence of physical findings it was thought best to do a lumbar puncture. Our surprise was great indeed on finding a cloudy fluid under slight pressure containing 2,000 cells, the majority being polymorphonuclears. Lumbar puncture the following day was filled with traumatized blood, but this was cultured, as was a subsequent specimen, and both were sterile. At the end of 72 hours the temperature was normal and at the end of 9 days she was discharged apparently in perfect health. Six days after going home I saw the baby following a period of 18 hours of fretfulness and crying, the temperature when seen being 103°F. She was immediately brought to Children's Hospital and a lumbar puncture done. At this time she showed very definite signs of meningeal irritation, vomiting, screaming, fullness of the fontanel, stiffness of the neck and abdominal distention. The spinal fluid contained 6,000 cells. Antimeningococcus serum was given intraspinally (10 cc.) and intramuscularly (5 cc.). Other injections were given, in all 4, averaging 10 cc. each. The temperature gradually subsided, the number of cells reaching 130. The laboratory reported on this day a definite meningococcus on culture of the first spinal fluid. The baby's general condition was excellent. The most interesting point in connection with this case was an apparent spontaneous cure of an undiagnosed meningitis which relapsed at the end of a week, and later proved to be meningococcus meningitis. I heartily agree with the other speakers in that meningeal irritation presents no specific symptoms. Such an instance was seen recently in a premature, with delayed cerebral hemorrhage. This patient also presented the symptoms of irritability, fever, interval screaming and abdominal distention.

Further discussion was participated in by **Drs. Prentiss Willson** and **Wm. H. Hough.**

POSTOPERATIVE LIVER ABSCESS*

Report of a Case

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Postoperative liver abscesses are evidently less common today than in the past. Some attribute this to more prompt recognition of the conditions at hand and the more effective eradication of that condition before an advanced infectious or septicopyemic process results from which liver abscess may develop. The case to be reported presented a difficult diagnostic problem and suggests the advisability of using a recently developed diagnostic procedure, namely, the visualization of the liver by means of thorium dioxide, in suspected cases of liver abscess as an aid to diagnosis.

Report of Case

A colored chauffeur, 44 years of age, was admitted to the medical service of the Gallinger Municipal Hospital complaining of "pain in the stomach, excessive abdominal gas, and pain all over the abdomen." He gave a somewhat inaccurate history, but stated that 2 days prior to his admission he developed a sharp pain in his abdomen, and was not certain where it first occurred. He localized it first in the epigastric region, but later in the right lower quadrant. The pain was severe and sudden and came on after eating strawberries. He did not give any history of having experienced previous digestive difficulties. He had not had a bowel movement since the onset of the pain. He had vomited twice in the daytime, both times following the taking of "some medicine." At the time of admission, the acuteness of the pain had subsided somewhat, but his abdomen remained very tender, and especially so in the right lower quadrant. He admitted having had both gonorrhea and syphilis and his personal history was otherwise essentially negative. His temperature on admission was 99°F.; the pulse rate 100 per minute. Physical examination revealed an undernourished, underdeveloped colored man lying in bed, anxious appearing, but alert and not apparently acutely ill. His respirations were rapid and shallow, 28 per minute. The abdomen was distended, resistant and tympanitic. It was tender all over, but especially in the right lower quadrant. There was no visible peristalsis, and auscultation first revealed a silent abdomen. Later, however, gurgling and some evidence of peristalsis was present. Otherwise, the physical examination was negative. The leukocytes numbered 5000 with 19 per cent lymphocytes, 26 per cent polymorphonuclear neutrophiles, and 56 per cent band forms. The urinalysis showed two plus albumen and an occasional leukocyte. A flat X-ray plate of the abdomen revealed no evidence of intestinal obstruction. Enemas were given with fair returns for fecal matter and gas. The tentative diagnosis was generalized peritonitis and adynamic ileus due to ruptured appendix. Under spinal anesthesia an exploratory laparotomy was performed on the third day after the onset of the symptoms. The intestines were found to be generally inflamed and markedly distended. The appendix was involved like the rest of the intestines and was removed. On further exploration, an accumulation of pus and a marked plastic exudate was found in the upper right part of the abdomen. Further search revealed a perforated duodenal ulcer on the superior-posterior aspect of the duodenum, about 3 cm. distal to the pylorus. A repair was made by suture and the abdominal incision closed with drainage at the upper and lower angles. The patient was placed in Fowler's position, and nothing given by mouth for 4 days postoperatively; 3000 cc. of 5 per cent glucose solution was given subcutaneously and intravenously daily for 4 days. He began to pass gas and his bowels moved on the fifth postoperative day. The temperature returned to normal on the sixteenth postoperative day and remained normal 2 days. After this a gradual but steady temperature rise occurred, and on the twenty-sixth postoperative day it reached 104°F., accompanied by chills. Daily searches failed to reveal any residual abscess. He had no pain, no abdominal tenderness, and the abdomen was flaccid. There was a small amount of purulent drainage from a small opening in the incision at the upper angle. The leukocytes at this time numbered 16,000 with only 16 per cent band forms and 57 per cent polymorphonuclear neutrophiles. An X-ray of the chest and abdomen did not offer any assistance in localizing a residual abscess. Fluoroscopy of the chest revealed "both diaphragms functioning normally." Four days later, on the thirtieth postoperative day, the temperature dropped to normal, the patient became very toxic and weak. A suggestion of jaundice appeared in the sclera of the eyes, and at this time a bulging of the right costal margin in the axillary line was noted. Aspiration was made and pus obtained, after which a trocar and tube were inserted in the tenth intercostal space in the midaxillary line. A pint or more of muddy pus was obtained. A transfusion was given and additional fluids forced, but he rapidly grew weaker, more toxic, and died 4 days later. At autopsy a sinus tract from the abdominal wound, communicating with a pus pocket behind the transverse colon, was found. A recent sinus tract extending through the right pleural cavity, peritoneal cavity and into a large loculated abscess in the right lobe of the liver was disclosed. Generalized peritonitis was present; both fibrous and fibrinous adhesions being present between the loops of the intestines. Healed and active ulcerations of the duodenum were noted and a right empyema of 2000 cc. was present. The causes of death were given as toxemia from peritonitis, empyema and liver abscess.

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* Read before the Society, May 11, 1932.

COMMENT

The possibility of a perihepatic abscess was considered when it became evident that the patient had a residual abscess of some nature, and certain symptoms forcibly suggested the possibility of a liver abscess, but rather late in the picture. The fact that the right diaphragm was not elevated and moved normally was sufficient to rule out a subphrenic abscess. Abscess of the liver could have been demonstrated quite conclusively, I feel certain, by the new "thorotrast" method of visualizing the liver.

The aspiration in this case was evidently a mistake, even though there was bulging. The pleural cavity was penetrated and pus escaped into the thorax as the needle was removed. The diagnosis was made too late to accomplish anything surgically, but had we availed ourselves of the "thorotrast" method, we could have operated properly and perhaps early enough to have effected a cure. The method should prove whether single or multiple abscesses exist and accurately locate them. This would aid materially in deciding whether aspiration or exploratory operation would be the better treatment.

DISCUSSION

Dr. Charles S. White: All cases of appendicitis that do not make a satisfactory recovery cause us concern. We should always think of abscess of the liver as a possible cause, but to prove it is quite a difficult matter. The method Doctor Collins suggests is valuable. I have had no opportunity to employ it in disclosing abscess of the liver, but feel that it has great possibilities.

Dr. Edmund Horgan: I think that the reason we do not have liver abscess more often is because the liver is able to take care of infection. Abscess in the abdomen is very common. In the process of its development and in the healing of an abdominal abscess, many organisms get into the lymphatics, and perhaps some into the portal circulation, and are carried to the liver. If an abscess forms in the upper right quadrant of the abdomen bacteria will unquestionably reach the liver. I should like to refer to a very interesting editorial in the Journal of the American Medical Association of May 7, 1932. It alludes to work done by Beibel, Essex and Mann, in a study on the susceptibility to poisons after the removal of the liver. They found that when the liver was removed the experimental animals were more susceptible to nicotine. More than likely the liver can take care of bacteria and bacterial toxins as well as it can other poisons. The diagnosis of liver abscess is difficult, but I have never seen a case that did not begin with a rather sudden rise of temperature and chill. A very high leukocyte count is always present and a mild degree of jaundice will develop. When a liver abscess is in the right lobe of the liver the movements of the diaphragm are somewhat restricted and can be observed with the aid of the fluoroscope. When the abscess is on the left side the restriction of the diaphragm cannot be quite so clearly noted on account of the position of the heart. In subdiaphragmatic abscess the diaphragm is much higher and there is usually a bulging upwards of the central portion of the diaphragm. This condition is not noted in abscess of the liver. I have had an opportunity to see a few cases of postoperative liver abscess and a few cases of so-called idiopathic liver abscess. All presented the same signs and symptoms. I think the introduction of a needle into the liver as a diagnostic procedure is very dangerous. It can be very easily understood how in the withdrawal of the needle the pleura can be contaminated. If the diagnosis has been made the introduction of a needle is not necessary as a diagnostic procedure and it is a wrong approach to the treatment. If it can be definitely diagnosed that the abscess is in the upper portion of the right lobe of the liver, the approach should be made by resecting one or two ribs, placing a pack between the pleura and the diaphragm and closing the wound. Two or three days later an incision can be made through the pleura without the danger of contamination. A small incision can then be made in the diaphragm and through it an exploring needle can be introduced into the liver to locate the abscess. When the abscess is located the needle can be used as a guide for a forceps which is used to open a channel for drainage If the abscess is in the lower portion of the lobe, a two-stage operation should also be made. Upon entering the abdomen the under surface of the liver can be located and the intestines separated from it. A pack can be placed between the under surface of the liver and the intestines and the abdominal wound closed. Two or three days later the wound should be opened and the abscess drained. If such a procedure is carried out the peritoneum will have been walled off so that the pus from the liver abscess can be drained without contaminating the peritoneal cavity. I should like to repeat that if the diagnosis of liver abscess can be made a two-stage operation should be employed.

Science Series. No. 7

RECENT ADVANCES IN THE PHYSIOLOGY OF SEX*

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The study of the sexual processes of the human being constitutes infinitely more than an inquiry into the physiologic, or physiochemical, nature of these processes. The mysteries of this ebb and flow, this "blood-consciousness" that we point to as the sexual side of the male's reaction to the female, and vice versa, will only be revealed when the physician realizes that the sexual changes in man manifest themselves in a three-fold manner—in intellect, through imagination and by physical means. The physical signs we are beginning to understand, but it behooves the farsighted physician to take a keen interest in these other phases of the sexual experiences. As a prominent gynecologist, who is also a profound student of man, was recently heard to observe, "It seems that every physician must be at least an amateur psychiatrist."

In this brief review of recent advances in our knowledge of sex physiology, however, the writer must of necessity speak as a biologist. The other portion of this picture, and perhaps the more interesting of the two, must be left to the intelligent practitioner. We must here deal with a few of the more fundamental and important of the many contributions now being made in this field. So much has been written relative to female sex hormones and pregnancy tests that attention will be drawn only to the more outstanding papers. It will probably be of benefit and interest to the clinician to call to his attention several studies which have not gained so much publicity in the medical press.

The entire study of sexual processes in man and animals was given great impetus by reason of the discovery of Stockard and Papanicolaou[1] that it is possible in the case of the female guinea pig definitely to follow changes of estrus to diestrus by examination, at set intervals, of the vaginal smear. It was pointed out by these workers that, during the anabolic phase of the estrous cycle in this species, the epithelium of the vagina undergoes considerable thickening, a cornified layer developing similar to epidermis. During the catabolic phase, degeneration of this epithelium occurs and removal takes place by means of leukocytes. These changes, each recognizable by a succession of cell types in the vaginal lumen, were found to be definitely related to the state of the ovary. It was further found that these cyclic phenomena ceased after bilateral ovariectomy, so the way was thereby paved for a test for potency of ovarian extracts.

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* Contribution from the Physiological Laboratory, Bureau of Dairy Industry, U. S. Department of Agriculture, Washington, D. C.

Soon after, this specific test was applied by Long and Evans[2] for the rat, and by Allen[3] for the mouse, and constituted the simple and easily qualitative method by which Allen and Doisy tested the potency of their follicular extracts in an attempt to crystallize the pure female sex hormone. Suffice it to say that three years ago, at the Thirteenth International Physiological Congress in Boston, Doisy[4] and his assistants announced the favorable culmination of their efforts, having obtained a pure crystalline hormone with a potency of about 3,000 rat units per milligram. Shortly after this announcement Butenandt[5] published reports on the crystallization of the same hormone, and this work substantiated in detail that of Allen and Doisy. Since this time various workers, notably Marrian[6] of England, have made an intensive study of the chemical structure of this crystalline hormone and have come to rather definite conclusions regarding its makeup. This hormone is now being prepared by an American pharmaceutical house and is being sold for clinical use under the patented name "Theelin."

During the recent fanfare of the finding of the crystalline hormone, there has been a tendency among some workers to forget the efforts and results of other researchers in this field. It seems only fitting that we should always keep in mind the early and continued efforts of Frank and his coworkers, Gustavson in particular, who worked from about 1905 up to the present time in an attempt to isolate this active principle. Even as early as 1925, Frank and Gustavson[7] had succeeded in preparing very active extracts from corpus luteum and had even gone so far as to suggest certain chemical groups in the structure of the crystalline product.

From a clinical point of view, attention is called to the untiring efforts of Frank to develop specific tests for the assay of female sex hormone in blood and urine of female patients. These tests have been worked out on an entirely practical basis and are being used by Frank and other gynecologists to show the excretion of this hormone by normal and abnormal patients. By means of this test Frank can differentiate clinically hypo- and hyperfunction of the ovaries by determination of the urinary excretion of this hormone during the menstrual cycle. Attention is called to the recent monograph by Frank[8] which the interested practitioner will find to be well written and of service to him in his practice.

Concerning female sex hormones, attention must be called to the splendid work of Corner and Allen[9] in the preparation of an active extract of corpus luteum. These investigators have shown that potent extracts of corpus luteum, when injected into castrated adult rabbits induce a proliferation of the endometrium apparently identical with the pro-gestational proliferation which had been previously shown to be due to the presence of corpus lutea in the ovaries. This proliferation is not due to female sex hormone, nor is it due to any specific hormone of the human placenta.

It may be stated that Hisaw[10] has discovered an aqueous corpus luteum factor which affects the pubic ligaments of the gopher and which he has termed "Relaxin." Whether or not this factor described by Hisaw is another separate hormone cannot be stated at this writing, but there is no doubt but that it does play a part in the relaxation of the symphysis pubis at the time of parturition. Hisaw has demonstrated that before this aqueous corpus luteum factor can act, sensitization of the animal or of the pelvic girdle has to occur. This sensitization is accomplished by use of the female sex hormone. In the monkey, Hartman has found a definite relaxation of the symphysis pubis during the last three weeks of gestation, which may or may not be brought about through the intervention of this corpus luteum factor. Smith[11] has been working rather intensively on the corpus luteum factor described by Corner and Allen (termed "Progestin") and finds that, whatever its function in the physiologic economy of the individual, its administration certainly does inhibit the production of female sex hormone and promotes its excretion. Smith has used "Progestin" in the treatment of abnormal flowing with apparently good results. However, the work is still too incomplete to warrant much generalization concerning the clinical application.

We come now to a short discussion of what is perhaps the most important single contribution in the physiology of sex to be made within the last three decades, namely, the finding by Zondek and Aschheim[12] and independently by Philip Smith[13] that the anterior lobe of the hypophysis plays a definite and very important rôle in the sexual cycle of the female. Zondek and Aschheim, and Smith have shown that implantation of an extremely small amount of hypophysis or placenta into the muscles of the thigh of an infantile female mouse or rat brings the infantile animal into estrus within four days.

Moreover, it was found by these workers that estral changes in the vaginal mucosa (tested by the Stockard and Papanicolaou method) were brought about indirectly by way of the ovary and did not occur when bilateral ovariectomy was carried out. It appears, therefore, that the hypophyseal hormone does not act directly on the uterus and vagina, but only through the ovary. It was further shown that in the mouse implantation of hypophysis causes three characteristic morphological changes in the ovary: (1) growth of the follicles, leading to rupture and discharge of ova into the tubes, (2) hemorrhage in many of the enlarged follicles, and (3) atresia of the corpus lutea by luteinization of follicles which are not fully matured. When Zondek and Aschheim found this hypophyseal substance in the decidua, corpus luteum, placenta, amniotic fluid, and particularly in the blood serum and urine of pregnant women, they quickly saw the possibilities of determining pregnancy by use of the test now designated as the Aschheim-Zondek pregnancy test.[12a] The test has been well described in current medical literature and need not be repeated here.

Friedmann[14] soon after applied the above test to the rabbit and found that it worked very satisfactorily. It has been known since the work of Marshall and his colleagues, Hammond in particular, that the rabbit ovulates only post-coituum and for this reason it is highly interesting to recall the explanation that Hammond gave of the cause of ovulation. In his earlier writings Hammond[15] spoke of the "generative ferment" of heat, and supposed that there was circulating in the blood a substance of unknown force carried in indefinite amounts to the ovaries, which it stimulated to a degree proportionate to the strength of the generative ferment. It seems now that his supposition was entirely correct and that we do have circulating in the blood indefinite amounts of this generative ferment which we now know to be the anterior hypophyseal hormone of Aschheim and Zondek. Ehrhardt[16] and others have applied this test in the determination of pregnancy in thousands of cases. By use of this test, properly carried out, one can determine pregnancy after the first three weeks with an accuracy of about 98 per cent. Further, Aschheim and Zondek showed that the urine of patients with chorionepithelioma and hydatidiform mole excrete large quantities of this hypophyseal factor in the urine, and this fact can be utilized in the diagnosis of these tumors.[17]

For the sake of clearness and completeness, the writer would emphasize that Zondek[18] believes that there are at least two sex hormones elaborated by the anterior hypophysis, and has designated these as "Prolan A" and "Prolan B;" "Prolan A" precipitates the maturation of the ovum and "Prolan B" causes luteinization. In addition, the general growth hormone of Evans[19] and a metabolism hormone are postulated. It is important to note that in the diagnosis of pregnancy in women, the essential criterion is the presence of "Prolan B" in the urine, which induces luteinization and formation of blood spots on the ovary of the test animal. Friedmann[20] has recently demonstrated the production of functional corpora lutea by injection of small amounts of urine of pregnancy directly into the follicles of the ovary. These injections result in a production of functional corpora lutea.

In addition, it has been shown by Frank that his test of urinary excretion of anterior pituitary hormone when compared to the amount of the hormone present in blood serum can be utilized in studying cases of amenorrhea and other syndromes which concern the hypophysis. I have used the Aschheim-Zondek test (the modification by Friedmann) in the diagnosis of early pregnancy in women, and have found it to be entirely accurate. It is interesting to note in this regard that my work corroborates that of Aschheim and Zondek in that we are unable to find this hormone in the urine of pregnant animals, namely the cow, rabbit and dog, even though we concentrate a great volume of urine from these animals during pregnancy. Various samples of urine from cases of acromegaly, carcinoma, and testicle tumor all gave negative results. Lack of space prohibits a discussion in this review, but the reader is referred to several important papers relating to the anterior lobe of the hypophysis,[21, 22].

(*To be continued*)

ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Cardiac Rupture with Perforation of Interventricular Septum. Report of Two Cases,"* by **Edgar Deucher Griffin, M.D.**

Rupture of the heart is moderately frequent following thrombosis, but perforation is usually through the wall into the pericardium, rupture of the septum being exceedingly rare. The event of interventricular rupture is accompanied by sufficiently characteristic symptoms and signs as to make the condition recognizable antemortem. There are, however, certain similar conditions that have to be differentiated, namely, external rupture of the heart allowing blood to pass through into the pericardium, and conditions in which an abnormal communication exists between the aorta and base of the right ventricle or between the aorta and pulmonary artery. An abnormal communication of this nature may be of congenital origin, the clinical evidences of its presence existing throughout life, but in the greater number of cases (Abbott) such an abnormal communication results from rupture of an aneurysm of the aorta into the pulmonic circulation. Three typical cases of interventricular rupture have previously been reported, two cases by P. M. Latham in 1845 and one case by A. S. Hyman in 1930. I have had the opportunity to observe two cases of perforation of the interventricular septum following coronary occlusion. Interventricular rupture like other ruptures of the heart occurs in middle or old age and is preceded by coronary disease with occlusion of a branch supplying the interventricular septum. Clinically the rupture is usually preceded by an acute illness in which all the symptoms may point toward some grave abdominal condition or the symptoms may at first simulate a respiratory disorder. The symptoms usually attract attention to the heart from the beginning, however, by severe pain in this region which may or may not radiate down the arms. In this initial period no diagnosis of septal perforation can be made. Examination of the heart at this time may be entirely negative or may indicate anginal failure. Electrocardiographic tracings may indicate coronary occlusion or myocardial fibrosis. Murmurs are usually absent and the history usually shows fair health prior to the acute onset. Perforation of the interventricular septum is ushered in by renewed syncope, by an increasingly harsh systolic murmur and thrill with gradual extinction of the aortic second sound, progressive fall in blood pressure with obliteration of the pulse, ashen pallor rather than cyanosis, and pulmonary inundation. The disproportion between the force of the cardiac impulse and the quality of the pulse, together with the increasing thrill and murmur and the absent second sound would appear to be particularly suggestive of septal perforation. The elapsed time from the onset of symptoms until rupture of the septum, according to a survey of the five cases at hand, varies from 2 days to 6 weeks. The symptomatology of other cases of cardiac rupture is quite different. When the rupture is into the pericardium the patient is seen to fall over dead or is found dead. If the patient survives for a short time the symptoms are those of acute collapse with pallor, air hunger, marked cyanosis, stertorous breathing, cold sweat and sometimes convulsions or unconsciousness. Prior to the rupture the patient may have had cough, dyspnea, vertigo, syncope, hematemesis, anginal pain, diarrhea, vomiting, etc., namely, the signs of coronary disease. Rupture of the heart into the pericardium usually causes instantaneous death or death in a very few hours, whereas the length of life following interventricular rupture is somewhat longer, death occurring anywhere from 17 hours to 3 days, later, according to a survey of the five cases.

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"Surgical Treatment of Intractable Pain,"* by **Harry H. Kerr, M.D., C.M.**

Pain, that most important symptom, should be relieved by removal of the cause, but in many instances this is not possible and one has to resort to interruption of the sensory pathways. This may be accomplished by division of the nerves proximal to the lesion. If a sensory nerve alone is affected, division of the nerves will suffice, but as most nerves are mixed in type, the cutting of such a nerve will produce accompanying motor paralysis which may be disabling. One may then interrupt the sensory pathways intraspinally by the division of the posterior sensory roots of the spinal cord without affecting the anterior motor roots. Should the distribution of pain be very wide, as in the case of carcinoma involving the pelvis or lower trunk, the pain pathways may be interrupted higher up in the cord itself. To accomplish this the spinal cord is exposed in the upper thoracic region, and the anterolateral tracts lying between the dentate ligaments and the anterior roots are divided with a sharp bistuary. When this is carefully performed no paralysis or interruption of the sense of touch or vibration result, but the sense of pain is completely abolished distal to the segment operated upon. In tic doloureaux, a disease characterized by lightning-like pains affecting one or more divisions of the fifth nerve, cure is effected by division of the root of the Gasserian ganglion either close to the ganglion in the middle fossa of the skull or in the posterior fossa where the root emerges from the pons. A similar type of lesion characterized by lightning-like pains at the root of the tongue and fauces, glossopharangeal neuralgia, is likewise relieved by dividing the nerve deep in the neck or by division of its root in the posterior fossa. The exact part that the sympathetic nervous system plays in the transmission of pain fibers is not completely understood, but some painful lesions may be relieved by removal of the sympathetic ganglia whose branches are distributed to the painful region. Thus the pain of angina pectoris is relieved by superior cervical ganglionectomy. Vascular lesions of the extremities with pain and impending gangrene can likewise be relieved by ganglionectomy. A number of cases of deep abdominal pain that were only amenable through surgery of the sympathetic nervous system have been reported.

* Presented April 20, 1932, under auspices of the Section on Nervous and Mental Diseases.

"The Modern Conception and Treatment of Comitant Convergent Strabismus,"* by **Wm. Thornwall Davis, M. D.**

In his remarks Doctor Davis mentioned the advance in the understanding and treatment of this type of squint in the last decade. The causes of squint are not fully understood; the accepted theories include hypermetropia, anisometropia, reduced visual acuity in one eye, weak or absent fusion, heredity, anomaly of muscle structure or insertion. According to Parinaud the essence of strabismus is excess innervation of convergence, followed by changes in the peri-ocular tissues. Injury or illness would seem to be causes, but such shocks could not produce squint if there were not a predisposition to it. The treatment consists in occluson and atropinization of the better (the fixing) eye, refraction, fusion training and surgery. Treatment is much more satisfactory if begun in the preschool age, thereby preventing mental and physical anguish from teasing and fights. If treatment can be instituted at this early age amblyopia does not develop, obviously a most important factor. Occlusion is most easily done by securing a hard rubber shield to the frame of the glasses, but care is taken not to induce amblyopia by this occlusion. Refraction is done under the cycloplegic effect of atropin and is repeated in less than a year. Orthoptic exercises may offer a possibility of cure, depending on the mentality of the child and the intelligent cooperation of the parent. In squints of high degree, occlusion, refraction and exercises are usually of little avail, and therefore immediate operation is indicated. The choice of operation is the Jameson recession. The advantages of this operation are many. There is a minimum of trauma; the muscle coverings, capsule, blood and nervous supply are not interfered with, and there is no tension on the sutures, so that only one day of hospitalization is required. The child may return to school within a week. Gut sutures are used, a most distinct advantage since many fear removal of sutures more than the operation. The definition of cure—straight eyes without glasses when accommodating—is a severe test.

PROPAGANDA FOR REFORM

Strychnine Poisoning.—Strychnine poisoning is rather frequent, and its occurrence is rendered dramatic by the dreadful agony of its course and the commonly fatal termination. Most of the sources of poisoning could be easily avoided especially in the tragic cases of infants. Moreover, the agony of the developed poisoning can be completely eliminated and nearly all fatalities could probably be prevented by proper treatment. The most prolific source of strychnine poisoning is chocolate or sugar coated household laxative or "tonic" pills. The dreadful slaughter from household "remedies" is the more regrettable since it has not been proved that the strychnine in laxative pills serves any useful purpose. Some restriction of the promiscuous sale of this violent poison in the guise of supposedly harmless household remedies is necessary and the board of trustees of the American Medical Association are considering the question of action along these lines. In the treatment of strychnine poisoning, the barbituric acid derivatives have opened a new chapter. They do not differ from the older hypnotics in principle but rather in the combination of high efficiency with relatively high safety, and by the fact that they may be administered intravenously in emergencies such as strychnine poisoning. (J.A.M.A., June 4, 1932, p. 1992).

*Presented May 4. 1932.

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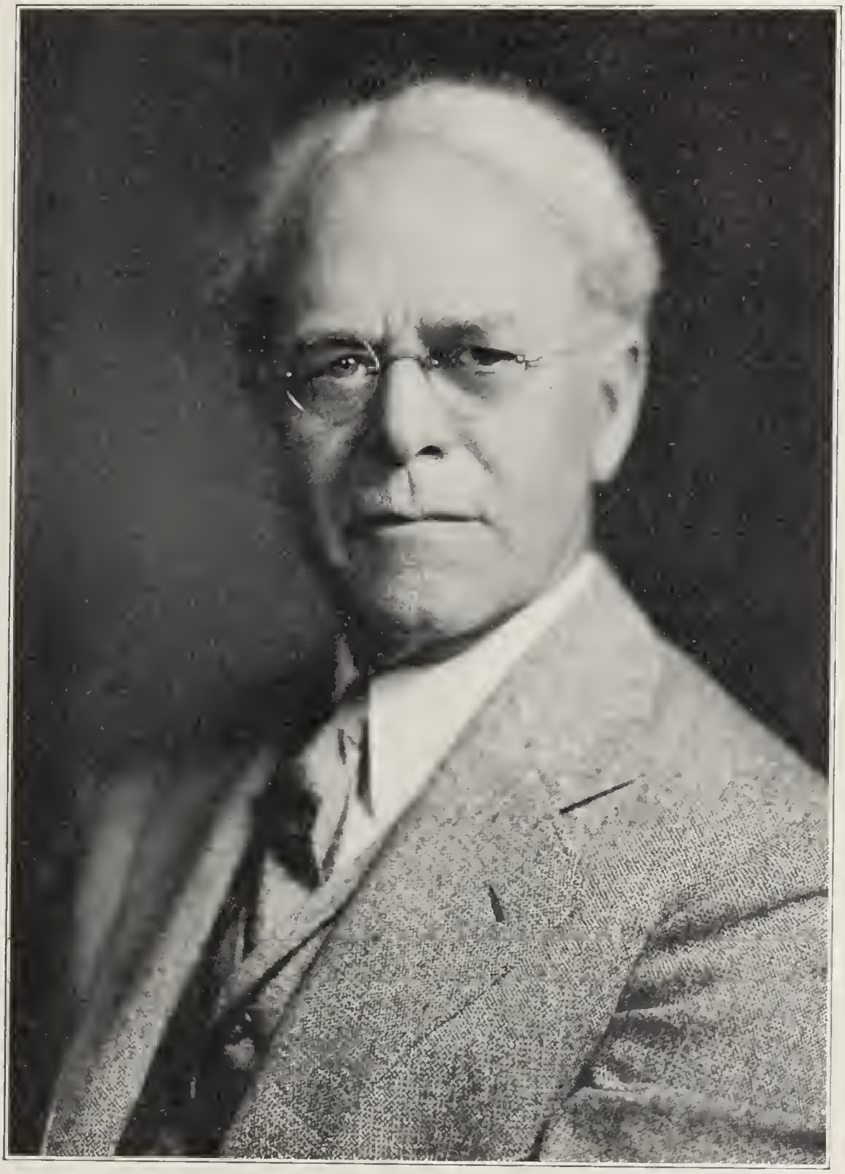
FOREWORD, 1932–33

We have reached and passed another milestone, the one hundred and fifteenth, since our Society was organized. As we have come to the close of another year it is but natural that we should review the accomplishments of the year just closing and consider the prospects of the coming year. Despite the widespread economic depression about which we read and hear so much and in truth which we individually feel so keenly, our Society during the past trying year has made definite progress. Our program of activities has expanded and "we point with pride" to our accomplishments. This result has been due largely to an efficient leadership, to the splendid organization which has been gradually developed for carrying on the work of our Society, and to the devotion and sacrifice of our members individually in furthering its interests and promoting its welfare.

During the past year there has been a small but definite increase in attendance at our meetings. The average attendance at both scientific and business meetings has been 132 as against 123 the year before. There has been a substantial increase in membership during the year. We now have on our rolls a total of 816 members made up as follows: Honorary, 8; Active, 679; Associate, 129. This is the largest enrollment the Society has ever had and shows a commendable activity and a real accomplishment on the part of the Membership Committee. A canvass made by this committee of prospective members shows there are approximately 977 physicians "who could be looked upon as potential members." Evidently there is still more work to be done in persuading some of these physicians of the benefits to be derived from affiliation with organized medicine.

All will agree that the programs of our scientific meetings have been of a high order of excellence, well balanced, with an excellent variety of well prepared papers of general interest and presenting a discussion of the more recent developments in medicine. The Program Committee for this year has already expressed its purpose of maintaining the high standard of the past year and if possible of raising the standard still higher. In this connection a significant request is made by this committee, namely, that those members who intend to present a paper this year, either on a Wednesday evening or at the Society's annual meeting, which has many of the features of a post-graduate assembly, start work on its preparation early and communicate with the committee during the summer, if possible, in order to assist in mapping out the work for the year. The preparation of a good paper, one that does justice to the subject and reflects credit upon the writer and the Society, requires much time and study. I express the hope that this request of the committee will meet with the sympathetic response it deserves.

The first meeting of the Society in each month is devoted to business affairs. The attendance at these meetings has not been as large as it should be. It is felt by many, no doubt, that the transaction of ordinary, routine business of the Society is dull and uninteresting and entirely lacking in dramatic episodes. However, as pointed out by our retiring President, a definite responsibility rests upon each member to attend these business meetings and to participate in



HARRY ATWOOD FOWLER, M.D.
President, The Medical Society of the District of Columbia, 1932–1933

the deliberations, since it is here that the policies of our Society are formulated, and matters often of vital interest and importance to every member are discussed and acted upon. There has been a widespread discussion in both the lay and medical press of the economic aspects of the care and prevention of illness. The Committee on the Costs of Medical Care which has been conducting a comprehensive survey covering a five year period, is expected to file a report during this year. It is suggested that with the approval of the Society a digest of this report with a summary of the recommendations formulated might be presented at one of our business meetings by some one connected with the survey and therefore familiar with its work. This should prove most interesting and informative to our members since this report will doubtless contain a most important mass of basic factual data. The profession should be fully informed concerning the definite trends in modern medical practice and the possible changes necessary to meet modern conditions. While keenly alert and conservatively responsive to any necessary changes, organized medicine must carefully preserve the traditions of our profession as regards the intimate relations between physician and patient which can not be sacrificed without mutual loss. The surest way of preserving our ideals which time and experience have shown to be essential to healthy progress and to a larger development of our purpose to bring the rapidly increasing resources of our art to the relief of suffering among all classes is through the support of an enlightened, organized profession. It is suggested that at our monthly business meetings provision be made for a formal discussion from time to time of some of these economic problems which are agitating organized medicine at the present time and are pressing for solution.

The activities of the Society, carried on during the past year through Committees on Public Information and Civic Health, achieved encouraging results. This important work should be continued and expanded. Definite plans of these committees will be presented to the Society in the early fall. It has been suggested by the Chairman of the Committee of Censors that some simple, formal dignified ceremony might be adopted for the reception of new members into the Society. This seems to me a very happy suggestion. A definite plan incorporating this suggestion will be presented to the Society for its approval.

It has been gratifying to note the activity of our younger members in the affairs of the Society by the presentation of papers of merit and in the discussions of scientific papers. This is a healthy condition, the importance of which to the Society and to the individual members can not be overestimated. The large number of small medical societies with a limited membership composed largely of the younger members of the profession no doubt serve a useful purpose by providing opportunities for closer and more intimate congenial contacts, social and scientific, among their members. The acceptance by a number of these smaller societies of the proffered use of the facilities of the Medical Society Building for their meetings tends toward harmonious relationship. The Societies of limited membership should prove valuable if the training they afford prepares their members for participation in the wider activities of the general Society. They should not, however, absorb the interest, time and energy of our younger men to such an extent that the distinct benefits derived from the wider contacts and opportunities in the Medical Society are sacrificed. It is hoped that during the coming year the younger members of our Society will show an increasing interest and participation in its activities.

In these times of rapidly changing conditions when new adjustments and new alignments are threatened and appear necessary a great responsibility rests upon organized medicine to guard against any change which is not strictly in the interest of both the public and the profession. The officers and various committees of the Society purpose during the coming year to uphold the high standards of organized medicine and to this end ask the support and cooperation of every member.

H. A. F.

THE WASHINGTON HEART ASSOCIATION

The Washington Heart Association, a constituent of the American Heart Association, has been in nominal existence for two years. It has lacked impetus in its infancy, but now it is hoped that an era of activity will begin. Recently interest has been renewed in this important organization due to the enthusiasm of those most familiar with the needs of Washington for the work it might perform.

Heart disease is a most important cause of death and apparently is becoming increasingly prevalent since preventive medicine has given the infectious diseases a beating. The Washington Heart Association has the following duties to perform: (1) survey of the heart disease situation in Washington, (2) dissemination of salient facts about heart disease both to members of the profession and to the public, (3) promotion of the establishment of efficient cardiac clinics throughout the city, (4) development of social service for poor patients with heart disease, (5) provision for hospitalization of such patients when necessary, and (6) encouragement of clinical investigation and laboratory research in various problems of heart disease.

The Washington Heart Association is not a group of cardiologists. Any physician or surgeon may be a member. Every medical man should be a cardiologist in the broad sense of the word. The organization already numbers about fifty men, and it is hoped that the membership will show a steady increase.

OUR PRESIDENT, 1932–33

Dr. Harry Atwood Fowler, the sixty-sixth member of this Society to have been elected to the office of President, is a native of Massachusetts and was graduated from the University of Minnesota, Bachelor of Science, 1895, later receiving the degree of Doctor of Medicine from Johns Hopkins University. In 1904 he became a member of this Society. Doctor Fowler is a Fellow of the American College of Surgeons and holds membership in the American Association of Genito-Urinary Surgeons and the American Urological Association. His year as executive officer will mean much in the advancement of the interests of organized medicine in the District of Columbia and a furthering of the spirit of friendliness traditional among the members of the profession in Washington. Each member would do well to read the summary of the Society's activities and expressions of policy in what may be considered an inaugural address of our new President appearing elsewhere in this number of the Annals.

NOTES

According to press accounts Dr. I. C. Riggin at present holding the office of Director, American Heart Association, will succeed Dr. H. G. Grant as director of county health work of the state of Virginia.

DR. MARY O'MALLEY, PRESIDENT-ELECT

At the Medical Women's National Association's meeting in connection with the American Medical Association meeting in New Orleans, Dr. Mary O'Malley, upon ballot, obtained the office of President-Elect. A previous statement in this publication relative to Doctor O'Malley's appointment as second vice president was made through error.

GUEST OF INTERNATIONAL MEDICAL CLUB, PROF. ERICH RUTTIN, VIENNA

At the Mayflower Hotel on July 8, 1932, the International Medical Club, which was organized several years ago for the purpose of entertaining physicians from foreign countries visiting in Washington, gave a luncheon for Professor Ruttin. The Minister of Austria, Mr. Edgar Prochnik, was also a guest, making a short address of welcome to his distinguished compatriot. A presentation illustrated by blackboard diagrams, subject "Streptococcus Mucosos Otitis Media," gave to the fifty members with their invited guests, much information concerning the Doctor's experiences in Vienna with this type of infection. Dr. A. B. Bennett, President, presided and introduced the guests and speakers.

REPRINTS

The following reprints have recently been received for which due acknowledgment is made:

"Pyridium Therapy in Genitourinary Diseases," Virginia Medical Monthly, June, 1931, by Lyle M. Mason, M.D.

"Chorea Gravidarum: A Statistical Study of 951 Collected Cases, 846 form the Literature and 105 previously unreported," Archives of Internal Medicine, March, 1932 and April, 1932, by Prentiss Willson, M.D., and Alec A. Preece, M.D.

THOMAS COLLINS STEVENSON MARSHAL, M.D.

Dr. Collins Marshall, born April 28, 1856, was graduated in medicine in 1883, becoming a member of the Medical Society of the District of Columbia April 4, 1888. His death occurred on June 29, 1932. He was one of our honored members who had been on the rolls for forty years.* His seniority number was 80.

*The Society's rolls now show that there are twenty-six remaining members who for two score years have been active members.

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At a recent meeting of the Executive Committee, the following officers were elected for 1932–1933:

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CORRESPONDENCE

EDITORS,
MEDICAL ANNALS OF THE DISTRICT OF COLUMBIA,

Gentlemen:

As one who for years has been somewhat active in the movement to add physical methods to the profession's treatment facilities, the writer wishes to express his pleasure at seeing E. E. V.'s editorial on "Physiotherapy in the District of Columbia" in your May issue. Credit is rightly given there to the capable young women assistants in this field of treatment without whose work it could not be carried on.

A few comments on the article, historical mostly, may possibly add to its interest for the medical practitioner and, in supplying these, data supplied by the late Dr. Frank B. Granger of Boston, during the World War in charge of physical therapy in the Surgeon General's Office, may be quoted as authority.

In April, 1917, soon after our country declared war, the American Electrotherapeutic Association sent a committee—the late Dr. Collins of Washington, Dr. Wm. Benham Snow of New York, now deceased, and Dr. A. Bern Hirsh, then of Philadelphia—to call on the Surgeon General and tell him of the valuable army work, in physical therapy carried on in European countries. Later Dr. Frank Billings of Chicago, among others, was sent over to study this field in the allied countries. Six months after that committee's call Surgeon General Ireland opened the first American department of physical therapy (then, physiotherapy) in Walter Reed Hospital—at the time a marked innovation in the profession. Those of that day can readily recall the prejudice against physical methods among physicians—so that due credit belongs to General Ireland for the initiative in the then existing situation.

He found no difficulty in obtaining medical directors for these departments in the various army hospitals. With Dr. Granger, commissioned a major, in charge in the Surgeon General's Office, certain of his Fellows in the American Electrotherapeutic Association were made officer's for such duty. This organization included the pioneer advocates of physical therapeutics in North America and so afforded a capable group for the purpose.

Non-medical technicians, named "physiotherapy aides," were gotten by calling on women's colleges from coast to coast. Out of some five thousand teachers and students who volunteered about 870 were selected for three-months' courses of intensive training at designated centers. Girls who had studied in physical education schools naturally had an initial basis for the work and some of the more capable ones became "head aides." Medical officers in charge of these technicians always refer with pride to the intelligent, devoted service they gave the veterans.

Your special article tells that "most hospitals boast of well equipped physiotherapy departments." Would that it were so; collective study, though, shows that even today, after all the enormous experience of the Army and the Veterans Bureau hospitals, too many hospitals prove the ignorance of their staffs as to what constitutes a modern, efficient outfit of this kind: a few lamps and electric machines with, perhaps, a non-medical person in charge were what was found. The fact that a medical graduate, after thorough postgraduate training in this field, should be the department director—his status to be that of each other member of the major staff—that, unfortunately, has not as yet penetrated the outlook of too many hospital staffs.

As for the abuses mentioned in your special editorial, four national organizations of doctors are doing much to improve the situation. These are the American Physical Therapy Association (the former American Electrotherapeutic Association), now in its 36th year; the American Academy of Physical Therapy, made up largely of Fellows of the former one who had served in the Army; the American Congress of Physical Therapy and, recently organized, the American Society of Physical Medicine, made up of those practitioners also interested in original research in this field.

As for ending the quackish cults who attempt to utilize physical treatment methods, your basic-sciences law, when enacted in the whole country, will do much to limit their activities.

Now as for the earlier term, Physiotherapy. After the unfortunate clause admitting laymen as Physiotherapists had crept into New York State's otherwise model medical practice act, Physical Therapy was the substitute term adopted by our representative organization, the American Medical Association. And doctors, their journals, societies and hospitals everywhere should make this change to ensure uniformity and mark their disapproval of the lay physiotherapist who aims at starting another quackish cult, opposing the medical practitioner.

PHYSICAL THERAPY

New York City,
June 27, 1932.

BOOK REVIEW

The Expectant Mother's Handbook, by Frederick C. Irving, A.B., M.D., Professor of Obstetrics, Harvard Medical School. New York: Houghton Mifflin Co., 1932. 199 pp., illustrated. Price $1.75.

This is an admirable little volume adequately covering its field. It largely avoids a fault of some similar works by not attempting to go too deeply into such subjects as the development of the fetus, discussion of which frequently only serves to arouse the patient's anxiety about the possibility of fetal deformity. The important fifth and sixth chapters on the general hygiene and diet in pregnancy are, on the whole, thoroughly satisfactory. It is to be regretted that not enough emphasis is placed on the routine weighing of patients as an essential part of adequate prenatal care and too much emphasis on the risk of miscarriage at the time of the missed menstrual periods. In my experience the reverse of the statement that, ". . . . most American women during the latter months of pregnancy are more comfortable in a properly fitting maternity corset . . . .," is true. The statement that intercourse up until the last six weeks of pregnancy ". . . is permissible in moderation, by which is meant not more than two or three times a week," would seem to be open to considerable doubt, at least on the score of what constitutes moderation at such a time. No mention is made of the not infrequent etiological relationship of intercourse in the early months of pregnancy to miscarriage. It is a relief to find a categorical denial of the possibility of determining or diagnosing the sex of the unborn child and of any relationship between maternal impressions and fetal deformity; and it is a positive pleasure to agree with the author in his castigation of the woman who, having had children, attempts to relate to the girl in her first pregnancy all the exaggerated obstetrical horrors of which she can think. The chapter on the biological aspects of pregnancy covering evolution and heredity is most interesting but would indicate that the book is intended for the more intelligent and cultured type of girl.

It is felt that this little volume will well serve the purpose for which it is written and that it may safely be recommended to the expectant mother.

P. W.

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BENIGN LYMPHOCYTIC MENINGITIS*

REPORT OF TWO CASES

WALTER ANDREW BLOEDORN, M.D.
Professor of Medicine, George Washington University School of Medicine

There has recently been described a small but important group of cases which have the clinical aspects of meningitis with sudden onset, headache, fever, stiffness and retraction of the neck and positive Kernig's sign, but in which the spinal fluid does not give findings strictly in conformity with hitherto described types of meningitis. In the spinal fluid there is an increase in the cell count varying from a few hundred to a few thousand with a great preponderance of lymphocytes.

The clinical picture simulates meningitis of bacterial origin. The spinal fluid, on the other hand, does not contain recognizable organisms. Smears and cultures are negative and the preponderance of lymphocytic cells usually raises the suspicion of tuberculous meningitis.

The picture is so striking, the danger of confusing this type of meningitis is so great, and the prognosis so universally good that I feel justified in calling your attention to this particular group of cases. If we recognize this type of meningitis as a distinct entity and become familiar with the clinical picture and spinal fluid findings, mistakes will rarely be made. It would appear that a sufficient number of reports of this type of meningitis are now on record to warrant describing the group as a distinct clinical entity although most textbooks still fail to make any mention whatever of it.

In 1925, Wallgren reported several cases of what he termed "acute aseptic meningitis" occurring in the Children's Hospital at Gothenburg, Sweden. He described the condition as occurring more frequently in children and young individuals with a short prodromal period, fever, headache, nausea and vomiting. Physical examination revealed stiffness of the neck, positive Kernig's sign and very rarely involvement of the cranial nerves. The striking finding was sterile spinal fluid with an increase in the cell count rarely exceeding one thousand, the great majority of the cells being lymphocytes. The picture resembled a meningitic syndrome similar to tuberculosis but differed from it in the clinical course and outcome. The cases were of short evolution, benign in character, and with no secondary complications. There was an absence of the usual local epidemiological relation which occurs in the infectious diseases. In 1927, Wallgren reported two more cases. All of his patients were thought to have tuberculous meningitis at the onset of the disease.

In 1929, Viets and Watts from the Massachusetts General Hospital, reported five cases of a type of meningitis characterized by acute but relatively mild onset with headache, vomiting and moderate fever. The disease was self-limited, lasting from three to six weeks and recovery occurred without residual paralysis. The spinal fluid showed marked lymphocytic pleocytosis. Tuberculous meningitis was suggested by the clinical appearance and the early spinal fluid reactions. The fluid, however, did not clot and organisms were not found. One of these cases developed diplopia due to weakness of both external rectus muscles.

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* Read before the Society, April 20, 1932.

In 1930, Gager reported a similar case with a spinal fluid count of 2,200 and 82 per cent of lymphocytes. This patient did not have cranial nerve involvement nor other palsy and made a complete recovery without complications. In 1931, Silberstein in Buenos Aires, described a type of benign meningitis simulating closely tuberculous meningitis. The spinal fluid showed a large proportion of lymphocytes but gave negative results on guinea pig inoculations. The disease followed an evolution to spontaneous recovery without sequelae. In 1932, Rankin described two cases in the British Medical Journal which he termed "aseptic meningitis." He called attention to the close resemblance to tuberculous meningitis, but the favorable course and ultimate complete recovery pointed to the type of meningitis which I am reporting.

Case 1: The patient was a white woman, aged 19 years, unmarried and a nurse. She was admitted to the Gallinger Municipal Hospital on May 13, 1931, complaining of severe headache more marked over the frontal region, nausea, vomiting and pain in the epigastrium. She stated that for several days previous to admission she had had a cold and that she had not felt well for about two weeks; her appetite was poor and she noticed also that she tired more easily than usual after moderate exertion. She had carried on her usual duties, however, until the day prior to admission. The temperature on admission was 100°F., the pulse rate 92 and respirations 20. There was some slight tenderness over the frontal sinuses which, however, transilluminated equally and well. The chest was clear to auscultation and percussion. The heart showed no abnormality except an occasional extrasystole. The abdomen was negative except for some slight tenderness over the epigastric region. The urine showed a slight trace of albumin and was otherwise negative. The white cell count on the day of admission was 6,000 with 58 per cent polymorphonuclears, 36 per cent lymphocytes, 1 per cent large mononuclears and 5 per cent band forms. A provisional diagnosis of influenza was made, and the patient was given the usual type of treatment. The following day the temperature rose to 102°F. The patient continued to have nausea and vomited at frequent intervals. She complained of severe headache, and examination revealed well-marked rigidity of the neck and a suggestive Kernig's sign. A spinal puncture was done at this time and 15 cc. of clear fluid was obtained. There was no apparent increase in the intraspinal pressure. The cell count was 590, with 80 per cent lymphocytes and 20 per cent polymorphonuclears. Smears were negative for organisms. The headache was considerably relieved by the spinal puncture and the patient appeared more comfortable. On the third day of hospitalization, while the temperature did not rise above 99.4°F., the rigidity of the neck was decidedly more marked; there was retraction of the head and the nausea and vomiting continued. A second spinal puncture was done, 30 cc. of fluid being removed with a beginning pressure of 18 mm. Hg which dropped to 4 mm. The cell count was 3,200 with 96 per cent lymphocytes and 4 per cent polymorphonuclears. Smears were negative for organisms, and cultures were made at this time. The Wassermann test of the spinal fluid was negative, and the colloidal gold curve was normal. The impression recorded by the pathologist and by the consultant who saw her on this day was "tuberculous meningitis." On May 16, the fourth hospital day, the headache decreased in severity, nausea was not as marked, and the patient did not vomit. There was marked rigidity of the neck and retraction of the head, and Kernig's sign was positive. Spinal puncture was repeated and 4 cc. of fluid withdrawn under a pressure of 4 mm. Hg; the cell count was 2,900 with 86 per cent lymphocytes. On May 18, the sixth hospital day, the temperature remained normal and the patient showed improvement. Nausea and vomiting had entirely disappeared and there was no pain. From this time on there was steady improvement, temperature remaining normal and the appetite returning. The white cell count of the blood during hospitalization varied from 6,600 to 8,700, the differential count showing an average of 61 per cent polymorphonuclears and 32 per cent lymphocytes. On May 25, the thirteenth hospital day, the spinal fluid showed 38 cells, of which 93 per cent were lymphocytes and 7 per cent polymorphonuclears. The patient made an uneventful recovery and was allowed to leave the hospital on June 23, 6 weeks after admission, apparently entirely well. At no time did she show any cranial nerve involvement or other significant localizing neurological findings. She has been observed at intervals since her discharge and has been carrying on her usual duties up to the present time without any difficulty, being entirely free from symptoms.

Case 2: The patient, a white man, aged 26 years, married, and a clerk, was admitted to the Gallinger Municipal Hospital on December 28, 1931, complaining of headache, general malaise and backache. He stated that he had become ill about 10 days prior to admission and had suffered during this time with headache, occasional nosebleed and a general feeling of malaise. Four days before admission he developed nausea and vomited several times. On admission his temperature was 100°F., the pulse rate 104 and respirations 24. Physical examination showed the chest clear on auscultation and percussion. The heart appeared normal. The blood pressure was 130 systolic and 90 diastolic. Examination of the abdomen was negative. The extremities showed reflexes slightly exaggerated; there was no paralysis or stiffness and no Kernig's sign. The neck was quite rigid and attempts at forward flexion caused considerable pain. The white blood count was 6,800 with 66 per cent polymorphonuclears and 25 per cent lymphocytes. The urine was negative except for a moderate trace of albumin. The following day his temperature rose to 102°F. He complained of considerable headache and vomited once during the day. On December 30, 2 days after admission, the headache became quite severe and there was marked stiffness of the neck and some retraction of the head. The spinal fluid was withdrawn under a pressure of 8 mm. Hg, rising to 18 with jugular compression and dropping again to 8. The fluid was not entirely clear, and 25 cc. of anti-meningococcic serum was given intraspinally. The cell count was 2,150 with 90 per cent lymphocytes and 10 per cent polymorphonuclears. Smears were negative for organisms. The patient continued to run a febrile course, the temperature varying from 100°F. to 102°F. The headache continued and the stiffness and retraction of the neck was marked. On January 1, 1932, spinal puncture was again done and 10 cc. of fluid withdrawn. The cell count was 885 with 93 per cent lymphocytes and 7 per cent polymorphonuclears. The patient showed considerable improvement the following day, and on January 3, the seventh day of hospitalization, the temperature dropped to normal and continued practically normal until his discharge on January 14. The blood and spinal fluid Wassermann tests were negative. The leukocyte count at no time was elevated, and the differential count showed little change from normal. He was discharged on the seventeenth hospital day in excellent condition. Smears and cultures of spinal fluid were entirely negative.

Summary and Conclusions

1. A type of meningitis has been described by a sufficient number of observers and from sufficiently widely separated countries in recent years to warrant the conclusion that it is at least a distinct clinical entity with which one should be familiar and for which one should be on the alert.

2. The disease is characterized by an acute onset with headache, vomiting and moderate fever. It is self-limited, recovery taking place usually without complications or sequelae.

3. The cerebrospinal fluid shows marked increase in the lymphocytic cells. The smears are negative and cultures sterile.

4. Tuberculous meningitis is the condition usually suggested by the clinical picture and cerebrospinal fluid findings.

5. The disease is benign and up to date complete clinical recovery has been reported in all cases.

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DISCUSSION

Dr. Wallace M. Yater: These interesting cases bring out three points. First, they confirm the statement of Veits and Watts that there is an aseptic type of meningitis, with lymphocytic response predominating. Second, we are still ignorant of the exact etiological factor of this condition, although undoubtedly it is of an infectious nature. Third, it indicates that we must be cautious in making prognostication in cases of meningitis until we are certain of the type. Last October I saw a patient with a condition which probably should be classified in this group. The patient was referred by Doctor Kushner and was later seen by Doctor Shugrue. She was a white woman, 24 years of age, who 10 days before admission to the hospital began to have a severe vertex headache, malaise, anorexia, nausea and vomiting. With this she had a moderate fever. There was moderate stiffness of the neck and a questionable Kernig sign. The reflexes were all equal but moderately exaggerated. Oppenheim test on the right leg was constantly and strongly positive. A confusing but interesting feature was moderate but definite edema of both optic discs. General examination and remainder of neurological examination were otherwise negative. Leukocytes numbered 4,900, with 76 per cent neutrophiles. Blood Wassermann and Kahn were negative. X-ray of the skull was negative. Spinal fluid was under moderately increased pressure with moderately increased globulin and 55 cells, mainly lymphocytes. Wassermann was negative in all dilutions. The colloidal gold reaction gave a mild meningitic type of curve. Cultures of the blood and spinal fluid remained negative. The patient ran an irregular fever for 8 days, the highest being 103°F., with a correspondingly elevated pulse rate. After this the temperature remained normal, and the patient left the hospital apparently well after two weeks. Stiffness of the neck and the edema of the discs were entirely gone two weeks later, and the patient has remained well since that time. I think the disease which these cases simulate are mainly tuberculous meningitis, syphilitic meningitis, poliomyelitis and encephalitis. This case, if it is of the same nature as those reported by Doctor Bloedorn, is probably the first case of this kind with bilateral papilledema. I think the main lesson from these cases is that a definite prognosis should not be given until a definite diagnosis has been made.

Further discussion was participated in by **Drs. L. T. Gager** and **E. Clarence Rice.**

INTRACRANIAL ANEURISMS*

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Aneurisms of the cerebral blood vessels are not infrequent causes of subarachnoid hemorrhage, especially in young people. In older individuals the aneurisms may grow to some size and produce symptoms through compression of various structures at the base of the brain. Having observed a number of such cases with their sudden catastrophes, as well as their unexpected recoveries, I am bringing before this Society a study of certain aspects of the problem.

In recent years there has been more emphasis upon the congenital nature of the aneurisms because of their occurrence in youthful individuals, their multiplicity, and their site and nature. Nevertheless, aneurisms due to arteriosclerosis and in rare instances to syphilis and to embolism (mycotic aneurisms) are also reported. An interesting sidelight upon the problem was recently shed by Woltman and Sheldon in their study of ruptured intracranial aneurism in a patient with stenosis of the aortic isthmus. In this condition, there is a tendency to alteration in the cerebral arteries either upon a developmental basis or conditioned by the primary aortic disease. In their collected cases intracranial hemorrhage occurred in 37 per cent, thrombosis in 19 per cent and aneurisms in 9.5 per cent. Cerebral symptoms were even more common. One must consider, therefore, that there was probably an extra strain upon the cerebral vessels in such cases, especially so since sclerosis occurred in them at early ages.

The aneurisms of later years may also rest upon a congenital basis, with the sclerosis of the arterial walls, and especially of the sac, occurring as a result of disturbed nutrition of the artery. Moreover, it is quite certain that aneurisms may exist over long periods of time, since the characteristic symptoms may date back for as many as thirty or even fifty years; and even then there may be no rupture. The situation of the aneurisms, usually at or near a bifurcation or branch of an artery, where the wall is naturally weak, cannot be used to distinguish congenital from arteriosclerotic aneurisms, since the sac may be formed only late in life when degenerative processes have weakened the wall at this particular point. In aged individuals, therefore, and in those affected by arteriosclerosis, the distinction between congenital and arteriosclerotic aneurisms is difficult and often impossible. Syphilitic aneurisms are quite rare, and even if found in cases of vascular or cerebral lues, may not be due to the syphilis. Spirochetes have apparently never been found in the wall of a cerebral aneurism. Aneurisms of the cerebral vessels arising as the result of bacteremia, as in sepsis, vegetative endocarditis, and pyemia are occasionally encountered. Aneurisms due to direct trauma of cerebral vessels are probably very rare, but I have seen one in which the internal carotid artery was apparently injured by the suicidal thrust of a lead pencil through the orbit.

The site of aneurisms has been noted in various reviews (Beadles, Schmidt). Although they are most common in the middle cerebral and next most in the internal carotid arteries, they may be found in any artery about the base. Inside the brain and over the convexity they are much less common. The miliary aneurisms emphasized by Charcot as the cause of intracerebral hemorrhage, and the cirsoid aneurisms of the cortex must be omitted from consideration in this paper because they would seem to belong to a different category. The left side is affected more frequently than the right. Multiple aneurisms may occur. Women are affected more frequently than men.

The symptoms due to aneurisms come under two categories: (1) Focal compression or destruction, and (2) rupture. Intracranial hypertension is rarely due to the aneurism alone, since if the sac grows to large size it does so very slowly, and also because of the fact that the aneurism is seldom so located as to obstruct the pathways of the cerebrospinal fluid. However, when rupture of the sac occurs, the symptoms of acute intracranial hypertension are most marked. Symptoms due to focal compression or destruction are extremely varied, depending upon the size of the mass and its location. For this consideration, aneurisms have been divided into an anterior and a posterior group (Sands), the division coming at the posterior communicating artery. Paralysis of various nerves is the most common set of symptoms, but pressure upon the pons may produce crural monoplegia, paraplegia, even quadriplegia. Compression of the optic nerve on one side may produce stasis in the central retinal vein and result in unilateral papilledema and retinal hemorrhages. Hypophyseal symptoms, with erosion of the sella turcica, have been reported. Contrary to general expectation, a bruit is very exceptional in aneurism and is by no means specific except for the arteriovenous variety. In pulsating exophthalmos it is common.

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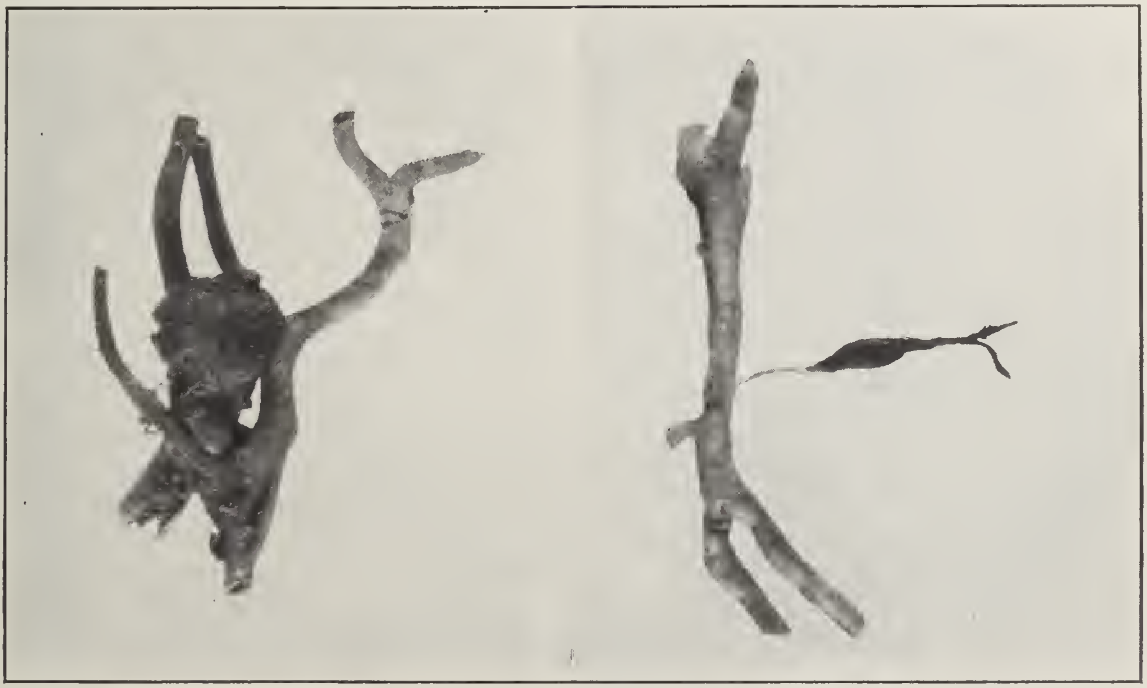
As a rule, the first notice that an aneurism gives of its presence is sudden and severe, and this is due to rupture of the sac. Such a rupture may not be fatal, since the rent may be small and the opening close spontaneously. Nevertheless, massive subarachnoid hemorrhages probably occur quite frequently as the result of previously unsuspected aneurisms of the cerebral arteries. If more of these spontaneous subarachnoid hemorrhages about the base were examined carefully by the pathologist, ruptured aneurism would be found quite commonly.



a b

Fig. 1. Two Types of Intracranial Aneurisms

a. Saccular aneurism of anterior communicating artery rupturing into lateral ventricles. *b*. Dissecting aneurism of lenticulostriate branch provoking massive intracerebral hemorrhage.

Symptomatology

Premonitory signs of leaking aneurism are not uncommonly present. Sudden attacks of unexplained headache, often associated with neuralgic pain in one side of the face, are reported by those who later develop definite ruptures. Occasional attacks of loss of vision in one eye, or paroxysms of vertigo and tinnitus have occurred. A rather full description of these symptoms is given by Adie.

The definitive onset is ushered in by sudden violent headache, sometimes unilateral but more frequently general, of such atrocious character that the patient may cry out and almost immediately faint. Vomiting and evacuation of the bladder may occur. When first seen the patient may be in a condition of shock with pallid leaky skin, superficial breathing and flaccid muscles. The blood pressure is low, the pulse rapid and feeble; ashen pallor rather than cyanosis is present. The pupils may be widely dilated and inactive to light; tendon reflexes are abolished. There are often no localizing symptoms in this early stage. The urine usually contains considerable amounts of albumin, and sugar may be present. Death is unlikely to occur during this first period of shock. The next stage is ushered in by increasing tonicity of the muscles, restlessness, rising blood pressure and temperature, and return of the patient to partial consciousness. At this period focal signs are apt to be present. These may be hemiplegia, oculomotor paralysis, conjugate ocular deviation and reflex grasping. If the patient becomes conscious he may complain of pain of agonizing character in the head and one side of the face, or he may be blind in one eye or may have diplopia. There is persistent rigidity of the neck that may simulate meningitis. The reflexes in the upper limbs are increased, while those in the lower may be lost. A bilateral Babinski phenomenon is common. The examination of the ocular fundi may be negative, or there may be edema of the disc on one or both sides, sometimes with hemorrhages. Hyperesthesia of the face may be observed.

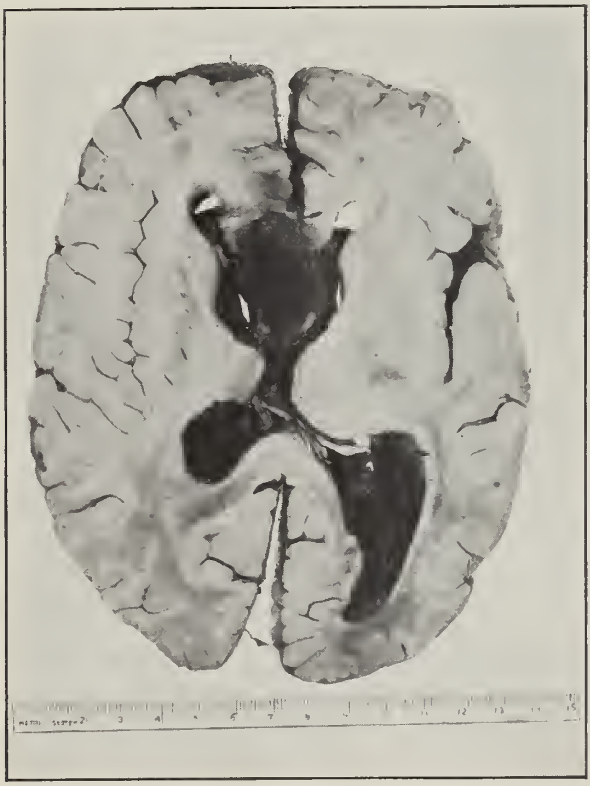


Fig. 2. Intraventricular Hemorrhage from Ruptured Aneurism Shown in Fig. 1*a*

In cases going on to rapid fatality, consciousness may never be regained, and from the primary condition of shock the patient may rapidly pass to that of typical apoplexy with stertorous breathing, flushed skin, bounding pulse and rapidly rising fever. Universal rigidity with tremors and the appearance of tonic cervical reflexes indicating decerebration appear in some cases, or the severity of the hemiplegia may suggest massive intracerebral hemorrhage.

In more favorable cases the symptoms tend to subside. Consciousness returns, the restlessness grows less, the paralysis, if present, regresses, and the patient continues to complain of the headache and of stiffness of the neck. If vision has been lost it tends to return rapidly, but palsies due to compression of nerves, as in the case of the oculomotor, are apt to remain. In the succeeding periods there is gradual restitution to normal and the patient may regain health and strength, the symptoms abating gradually or rapidly depending upon the severity of the original damage. At any time, however, there may be recurrence of the bleeding, and the process may be repeated by degrees of varying severity. One patient survived her first attack for more than a month and then died within two hours of the beginning of the next one. Survival of some patients, even after repeated attacks, may last for twenty years.

DIAGNOSIS

The most important diagnostic feature in the history is the occurrence of premonitory symptoms as mentioned above: sudden unexplained headache with stiffness of the neck and neuralgic pain in the face. The history of the onset of bleeding is not specific, since ruptured aneurisms may simulate intracerebral hemorrhage, cerebral thrombosis or subdural hemorrhage and even acute meningitis. The benign course in favorable cases, with rapid clearing up of the symptoms after a stormy onset, is of considerable significance. The occurrence of unilateral neural paralyses is almost characteristic. Albuminuria and glycosuria tend to exclude thrombosis and subdural hemorrhage, but these are frequent in intracerebral hemorrhage. However, if these have been present and the patient survives, aneurism is more probable, since they are present in intracerebral hemorrhage chiefly when the hemorrhage ruptures through into the ventricles. In cases of intraventricular hemorrhage, however, profound unconsciousness is present and death always follows.

Lumbar puncture in cases of ruptured intracranial aneurism almost always yields bloody fluid. In rare cases the fluid is entirely normal. If the puncture is made during the early stages, the red cells may not have become diffused through the fluid. After some days the fluid has a yellowish tinge after centrifugation of the suspended corpuscles. Without blood in the spinal fluid it is seldom possible to make a diagnosis of ruptured intracranial aneurism unless the history is unequivocal. Even with xanthochromia or bloody fluid the hemorrhage may be primarily subdural. Nevertheless, most authors warn against the use of lumbar puncture in all cases of suspected spontaneous intracranial bleeding on account of the danger of decompression, which might result in recurring hemorrhage and death. In a number of cases death has followed shortly upon the performance of diagnostic lumbar puncture, and repeated lumbar punctures are emphatically warned against.

X-ray examination is usually negative in cases of aneurism. Nevertheless, a few cases have been described in which the occurrence of a hollow spherical shadow due to calcification of the wall of the aneurism has been observed, or in which erosion of the skull either at the base or elsewhere has been proved to be in association with aneurisms. The rarity of such findings goes pari passu with the rarity of large aneurisms.

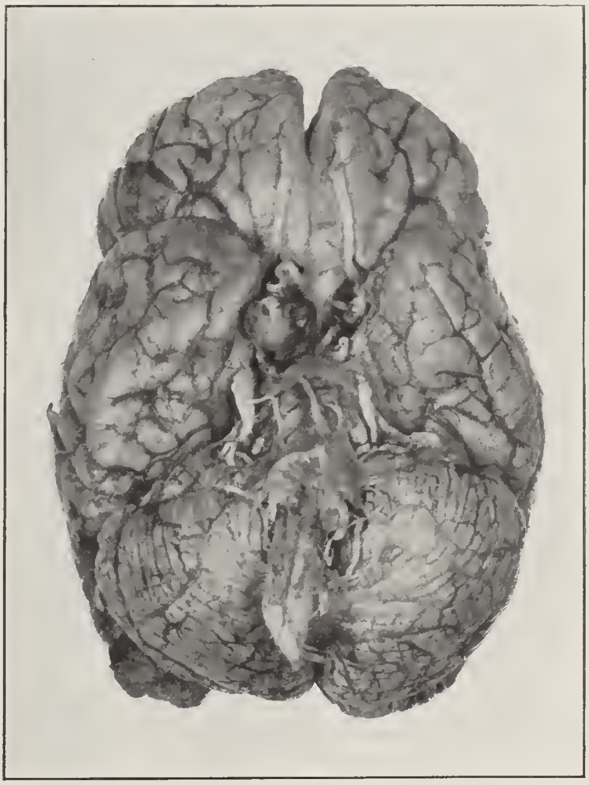


FIG. 3. UNRUPTURED SACCULAR ANEURISM OF POSTERIOR COMMUNICATING ARTERY

The internal thrombus had extended into the posterior cerebral artery and later into the internal carotid artery producing complete thrombosis of the hemisphere.

TREATMENT

This condition is usually suspected only when lumbar puncture reveals bloody fluid. Lumbar puncture, however, is a dangerous procedure in the face of spontaneous intracranial bleeding, and if there are sufficiently characteristic signs beforehand it is to be avoided; and if it is done for diagnosis it should certainly not be repeated. Indirect measures for the control of the intracranial bleeding must therefore be inaugurated. Probably the best one is free venesection. This tends to reduce arterial pressure, to control the development of cerebral edema, and to increase the tendency of the blood to clot. From 500 to 800 cc. may be removed with impunity. Contrary to the general impression, it is better to have the head low, since the medullary circulation is improved and the blood pressure does not rise from anoxemia of the vasomotor center. If breathing is impaired, the patient may be turned on the face, since retraction of the neck and freer circulation is thus favored. Oxygen administration is highly desirable and is sometimes a life-saving measure, even in the absence of cyanosis. The patient should be shifted frequently in order to avoid pulmonary hypostasis and collapse.

If in spite of these measures the temperature and blood pressure continue to rise and the pulse rate to decrease, indicating cerebral compression or edema, 50 per cent glucose may be injected intravenously in 20 cc. doses every 2 hours; and if the condition remains desperate transfusion of whole blood may be required to maintain the cerebral circulation above the vital minimum. Sometimes it is well to defibrinate the blood obtained from the primary venesection and add glucose to the extent of 5 per cent to be kept for later emergencies.

Close watch should be kept on the temperature, pulse, respiration and blood pressure. When they return closer to normal, the bleeding may be presumed to have stopped. During the period of watchful waiting it is best to allow the patient to remain markedly dehydrated and to begin the administration of fluid only after three days. The general condition of the patient will then demand attention. The skin will be lax and inelastic, the muscles flabby, the pulse rather rapid and the blood pressure low. The temperature may rise from dehydration alone. It will then be found that a fluid intake of 2500 to 3500 cc. in 24 hours administered by several channels will bring about rapid improvement in the patient's general condition, and the temperature will drop to normal.

Prolonged rest in bed with a minimum of exertion is then to be enjoined upon the patient, in the hope that the clot will become firmly organized and future ruptures avoided. The danger period is from the tenth to the twentieth day when the clot undergoes liquefaction before organization. The treatment of the headaches by anodynes and caffeine may give relief; insomnia may require sedatives although hydrotherapy and massage are to be preferred, and the nutrition of the patient is to be increased. If hemiplegia is present, frequent passive movement, particularly at the shoulder, will prevent contracture. Recurrence of bleeding gives rise to headache of the same peculiar splitting type that the patient will recognize, or if the patient is unable to communicate with his surroundings, it will be recognized by the aggravation of the general state, and particularly by a rise in temperature otherwise unexplained. The primary measures for the control of the hemorrhage are then to be recommenced.

Surgery has little to offer in the treatment of intracranial aneurisms. Occasionally, a superficial one is removed, but those about the base and internally cannot be attacked directly. Ligation of the internal carotid has occasionally yielded good results, but the incidence of hemiplegia is rather high. It may be possible, some time in the future, to operate successfully for intracerebral rupture of a sylvian branch, but I know of no instance in which this has been carried out with recovery. Bagley has recently reported success in a few cases of intracerebral hemorrhage in which cysts were evacuated.

Prognosis

At necropsy a silent aneurism may be found that had evidently been present for many years, and some cases are reported in which definite symptoms of neural compression had been intermittent or continuous for a long period of time. Once the aneurism has ruptured, even if the patient has recovered, the prognosis is guarded but not absolutely unfavorable. Not only may rupture occur again, but other aneurisms may be present and rupture at a later period. The hemiplegia consequent upon ruptured aneurism tends to improve if not to disappear entirely, since the bleeding is superficial in patients that recover. The neural paralyses, especially the oculomotor, may persist for a long period or even be permanent.

Summary of Cases

The material upon which this paper is based consists of 12 patients, of whom 8 died and 4 have recovered so far. These represented several different types. In 2 cases, ruptured aneurisms of the anterior communicating artery were found, with hemorrhage thrusting up through the interventricular septum into the lateral ventricles. Death in both cases followed shortly upon lumbar puncture. Differential features seemed to be glycosuria, hyperthermia and reflex grasping. Two patients had aneurisms in the sylvian distribution, one patient living 2 months and dying within 2 hours of the onset of the second attack. One patient sustained a tremendous intracerebral hemorrhage from rupture of a small branch of the lenticulo-striate system and died in 35 minutes. One patient injured the internal carotid artery by thrusting a pencil through his orbit (reported by Langenstrass). The aneurism ruptured 3 weeks later. One patient recovered to date after 3 attacks, during which the oculomotor nerve was paralyzed on the right side, probably from an aneurism of the posterior communicating artery. In one patient, a marble-sized aneurism was found, unruptured on the posterior communicating artery. In another, who recovered, the location of the aneurism was indicated by loss of vision in the upper half of each visual field. The other patients had the typical onset and findings, but without localizing signs. One recovered and one died.

Conclusions

Twelve cases of intracranial aneurism are reported, showing different phases of the problem. There is no typical clinical picture, but ruptured aneurism should be suspected especially in a young individual who suffers sudden terrific headache, with vomiting and prostration. Paralysis of either hemiplegic or neural type is quite suggestive, and bloody spinal fluid is almost diagnostic. In older individuals intracerebral hemorrhage cannot usually be differentiated from ruptured aneurism, but if a patient recovers from an attack of subarachnoid hemorrhage, rupture of an aneurism was probably the cause.

Larger aneurisms are less prone to rupture than are small ones, since their growth is apt to be associated with clotting. While this is a conservative process, the thrombus may extend into neighboring vessels and produce widespread infarction. Intact aneurisms are seldom the cause of intracranial hypertension since they grow very slowly and do not obstruct the fluid pathways.

The treatment is directed toward the maintenance of life during the period of clot formation in the ruptured aneurism. Complete rest, venesection and dehydration are suggested, and lumbar puncture is considered dangerous. Prolonged slow recovery should be allowed. The prognosis is uncertain, but not entirely bad even when rupture has occurred.

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DISCUSSION

Dr. Charles Bagley, Jr., Baltimore: I should like to show some slides dealing with vascular ruptures and aneurisms that have come to my attention. Intracranial hemorrhages are divided into meningeal and cerebral types, the former being subdivided into the small diffuse hemorrhage and the focal clot, and the intracerebral type into the large group of ordinary apoplexies and a smaller group of superficial hemorrhages beneath the cortex which are more amenable to surgical attack. These hemorrhages usually take place in the temporal or occipital lobes, grow and produce death by gradually increasing intracranial pressure. If the patient can be tided over a while, the blood may soften and be withdrawn from an apoplectic cyst. Opening the skull too soon entails too great an operative risk. Lumbar puncture is to be avoided if a clot is present. Blood in the spinal fluid prolongs the illness, and, therefore, to drain in traumatic bleeding is safe, but in bleeding from a ruptured aneurism it is dangerous. As a rule, aneurisms tend to clot during the first 2 weeks, but then may repeat their hemorrhage. Sometimes a deficiency in the elastica may be the cause of rupture in young individuals without aneurisms.

Major Paul E. McNabb: Doctor Freeman and Doctor Bagley have covered the subject of intracranial aneurisms so thoroughly that I can add nothing other than a few previously unreported cases which tend to show that the condition is more common than most of us realize. For instance, in approximately 700 autopsy protocols which I have recently reviewed, I found 3 cases in which death was due to rupture of an aneurism at the base of the brain. All of these deaths occurred in persons under 40 years of age. One was a woman who had what was probably a small subarachnoid hemorrhage 7 years before the final episode which resulted fatally. Certainly the history is very suggestive and at autopsy there were multiple cobwebby fibrous adhesions and marked thickening of the pia-arachnoid at the base, and a definite aneurism of the anterior cerebellar artery at its origin from the basilar was found. The cavity of the aneurism was obliterated by fibrous tissue; the terminal fatal hemorrhage had occurred from a rent in the basilar artery at the level of the old aneurism. It is interesting that both parents and one sister of this patient had had a cerebral hemorrhage. The existence of a familial tendency to intracranial hemorrhage is in harmony with the prevalent belief that many subarachnoid hemorrhages occur because of congenital vascular defects as Doctor Freeman has pointed out in his paper. Another case was a soldier 31 years of age whose vessels were not sclerotic and who did not have anatomic or serologic evidence of syphilis. He had a spherical aneurism at the union of the vertebral arteries to form the basilar artery. This measured 2 cm. in diameter and had ruptured; there was massive recent hemorrhage which filled the basal cisterns. A third patient, a soldier aged 40 years, had moderately advanced cerebral arteriosclerosis and a wide rupture of a small arteriosclerotic aneurism also of the basilar artery. I should like to restate a few of the points which Doctor Freemen brought out. In simplest form the salient clinical features may be about as follows: a person under 40 years is suddenly struck down as if by a blow on the head or is suddenly stricken with a severe headache usually accompanied by vomiting; shortly afterwards signs of meningeal irritation, especially pain and stiffness of the neck develop; there is often initial unconsciousness or mental confusion which partially clears up after a few minutes or hours; gradual restoration to normal may now occur, or a gradual lapse into coma with signs of increasing intracranial pressure may end in death. A bloody spinal fluid in all 3 tubes confirms the diagnosis of subarachnoid hemorrhage, but lumbar puncture should be used with caution. Without spinal tap the above clinical findings strongly suggest hemorrhage into the subarachnoid space which, however, may result from rupture of a vessel when no aneurism is present. I have made a correct diagnosis of spontaneous subarachnoid hemorrhage without the aid of spinal puncture 5 times in the last 6 years from the clinical record of cases which I had not seen in person. In 2 cases, ruptured aneurism was found at the base; in the third case the basal cisterns were filled with blood but the point of rupture was not found at autopsy; and in the fourth and fifth a hemorrhage into the white matter of a frontal lobe had ruptured through the cortex into the subarachnoid space; no aneurism was found in either case. Having a convenient memory, I have forgotten how many times I have suspected subarachnoid hemorrhage but failed to find it at autopsy.

CLINICAL ASPECTS OF ANEURISM OF THE AORTA*

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John Hunter was a pioneer in the study of the subject of this symposium, vascular disease, as well as of the other subject so closely associated with it, the "lues venerea." Not only did he have his own personal experience, beginning with his self-inoculation and ending with his fatal anginal attack, but from numerous observations both clinical and experimental he drew the generalization that aneurismal bulging was not haphazard and occurred only when disease of the vessel wall paved the way. This conclusion still holds true, not only of syphilitic aneurism of the aorta but of the rarer forms of aneurism due to trauma, to dissection, to bacterial invasion and to atherosclerosis. In health the aorta offers marvelous resistance by reason of its architecture and structure, its position and attachments, to the constant play of the forces of blood pressure within and of traction without. But in the presence of the systemic diseases it may become a vulnerable spot, and a variety of pathological changes and clinical pictures may ensue.

Traumatic aneurism, really a false aneurism because it is not limited by any of the vascular coats, is the result of direct or indirect violence, but for the rupture that arises there is most often some added reason. In younger victims

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* Read at the Annual Meeting of the Society, May 5, 1932.

there is a frequent association with stenosis (coarctation) of the aorta, which has led to hypertension and precocious degenerative changes localized in the vessel wall proximal to the site of narrowing. In older people atherosclerosis is a factor in determining the rupture and its site. In the case of a middle-aged man who fell from a window onto his head and drove his chin into the upper sternum, the direct blow—and probably the secondary compression—had caused the aorta to give way in an area of sclerotic change.

Dissecting aneurism of the aorta is an exceedingly instructive sort of lesion. As a not uncommon complication of hypertension and vascular sclerosis, it usually begins with an intimal tear. Recent work suggests also the etiologic importance of degenerative changes in the media. After breaking through the intima, the extravasating blood finds its path of least resistance in a lengthwise splitting of the layers of the middle coat and a "tube within a tube" is formed. From the two especially predisposing sites, the root of the aorta and the arch at the origin of the duct of Botalli, the dissection may extend to the iliac bifurcation and even out some of the large arteries. There is a good deal of force to the dissection, and intercostal arteries or even larger vessels may be occluded or actually sheared off. Consequently there can result the greatest variety of symptoms and signs, ranging literally from crown to toe, depending on the vessels that are damaged and the organs whose blood supply suffers. Sharp pain, associated with the first and successive ruptures and hence of unusual and extensive distribution, is likely to dominate the picture. Circulatory anomalies come second.

These patients with dissecting aneurism do not all die of hemorrhage into pericardial, pleural or peritoneal cavities; in perhaps one out of five or six cases, the new column of blood gets back into the aortic lumen and "healing" ensues. In one old man this winter whose chronic hypertension had ended in uremia the postmortem examination revealed a "healed" dissecting aneurism reaching from arch to bifurcation. Its occurrence was dated by digging back to a history of severe thoracic pain six years before. Another personally studied instance, in a woman of middle age, was marked by sudden collapse and death in shock a few hours later, hemopericardium being found at necropsy. A man of 68 years lived five days with a dissection involving the entire length of the aorta, then died from mediastinal rupture. Possibly by recognizing the nature of the lesion and enforcing rest, there is a chance for the physician to increase the number of dissecting aneurisms that go on to "healing."

Mycotic aneurisms occur in the course, and as a part, of the severe bacterial infections, mainly due to streptococci, staphylococci, pneumococci and the tubercle bacillus; and because they are obscured by the septicemia or malignant endocarditis the study of these lesions is usually reserved for the pathologist.

Atherosclerotic aneurism of the aorta is much more likely to be abdominal than thoracic and is decidedly a lesion of the aged; Korns' four cases were 67, 74 and two 84 years of age. It occurs when the primary intimal degeneration extends into media and adventitia and the weakened wall slowly gives way. In a man in the early sixties who came under my care with an unusual degree of widespread arterial disease and a terminal coronary thrombosis, x-ray study showed a distinct bulging of the descending arch. The admission of specific infection and a two-plus blood Wassermann reaction pointed toward the common type of aneurism; at necropsy there was a sacculation 4 or 5 cm. in diameter with atherosclerosis present and not the slightest evidence of syphilis. Like the "pulsion aneurisms" described by Schottmüller, the influence of blood pressure probably made this defect more conspicuous during life.

In syphilitic aneurism of the aorta we come to our main problem. The incidence of aortitis and the questions of early diagnosis and treatment I have discussed in a previous paper before this Society; and if the prophecy comes true that the increase in primary infection during and after the World War is about to reflect itself in a correspondingly increased morbidity from aortitis, timely diagnosis becomes more desirable than ever. But for one reason or other many patients with syphilitic aortitis will never present themselves until compelled by its late complications of (1) aneurism, (2) aortic insufficiency and (3) obstruction to the coronary artery orifices. These lesions and their accompanying disorders of function may come alone or together; in the case of aneurism the diagnostic features fall under the heads of (a) mediastinal tumor and (b) heart failure, which in turn may be either of congestive or of anginal type.

The presence of a mediastinal mass is detected directly by an increase, upon percussion, of the width of retrosternal dulness. The appreciation of dulness in the interscapular region is much less satisfactory. Indirect evidence of such a tumor comes from the effects of pressure on the neighboring intrathoracic structures, the nerves, great vessels, esophagus and air passages, and the great variety of signs and symptoms which thus arise gives to the differential diagnosis of aneurism its wide and perennial interest.

Besides the pain and dyspnea which, with or without cardiac involvement and failure, are particularly the mark of aneurism in contrast with Hodgkin's disease, lymphosarcoma, carcinoma and the rarer mediastinal tumors, the pressure effects of aneurism fall into five distinctive groups. (1) Huskiness of voice or aphonia is highly suggestive of vocal cord paralysis following pressure on the left recurrent laryngeal nerve. A laryngological examination is always necessary as illustrated by the case of a man sent into the heart clinic with a husky voice who was found to have carcinoma of the larynx. Tuberculosis and syphilis of the larynx are other common causes of loss of voice. Other tumors, also, press upon the recurrent laryngeal nerve. The dilated left auricle in a girl with mitral stenosis was the factor which digitalization removed, with prompt return of the voice, while the removal of a substernal thyroid in a man of 50 years restored normal vocal cord movement within two days. (2) Pressure on the large vessels of the neck or thorax produces suffusion or cyanosis, venous distention, edema and effusions, pulse inequalities and disturbances in blood supply. (3) Inequality of the pupils is helpful evidence of sympathetic chain involvement and departures from normal heart rate and other evidence of autonomic imbalance may result. (4) Pressure on the trachea brings the "brassy" cough, and on the bronchi, stridor, asthma, atelectasis, pulmonary infection. Such aneurisms create clinical simulations of bronchial asthma, carcinoma, bronchiectasis. (5) On the esophagus the effect of pressure is seen in dysphagia, loss of weight and cachexia. On the other hand, an aneurism may long be symptom-free and the steady boring pain of erosion of a rib or vertebra first call attention to its presence.

With this suggestive array of symptoms and signs, what is pathognomonic of aneurism? I would emphasize the presence of an expansile pulsation. Pulse anomalies, murmurs, a diastolic shock, syphilitic stigmata elsewhere are helpful, but a tumor whose contours expand with the heart beat is almost certainly aneurismal. The expansile pulsation may be directly visible or palpable, or felt through the tracheal tug, or it may be revealed by fluoroscopy. In the detection of early aneurism, indeed, the use of the fluoroscope is indispensable; experience is convincing that it is the great preclinical aid to diagnosis. Unfortunately for diagnostic perfection, an aneurism may become so filled with laminated clot that pulsation is damped and disappears; this was the case with a palpable carotid aneurism in a woman with hypertension, whose diagnosis was in doubt until necropsy. In a man of 50 with a negative blood Wassermann reaction a large mediastinal shadow showed no pulsation, and decrease in size rather than extension with relief of upper abdominal pain was noted during six months of specific treatment, so that the diagnosis of a solid neoplasm was changed to one of aneurism. Recently a competent roentgenologist reported no pulsation of a small, smooth mediastinal shadow in a young man of 29 who had had difficulty in swallowing for three weeks. There were no other symptoms, and the blood Wassermann reaction was a doubtful positive. Lymphosarcoma was considered as the most probable condition, and potassium iodide as well as deep radiation were suggested as therapy. This patient died suddenly with the signs of asphyxiation, and necropsy showed the rupture of a small aneurism just beyond the transverse portion of the arch. Another patient in his fifties had the clinical and electrocardiographic evidence of coronary obstruction. His aorta under the fluoroscope showed a peculiar deformity and suggested a blood Wassermann test. The result was positive and there has been improvement under specific treatment.

Summary

Aneurism of the aorta occurs in five principal forms upon the basis of pathological changes which vary from congenital malformation to senile arteriosclerosis. Syphilitic aortitis is the predominating factor for the development of thoracic aneurism. Bacterial aortitis and the strain of hypertension bring rare types of aneurism.

The symptoms and signs of mediastinal tumor are a warning for the clinician to search for aneurism. The range of disordered function and structure includes the domains of the ophthalmologist, the laryngologist, the neurologist and the surgeon as well as of the internist.

Other evidence of vascular disease and of syphilitic disease elsewhere in the body, and particularly the presence of expansile pulsation, serve to differentiate aneurism from the solid tumors of the mediastinum. The unique value of the fluoroscope in early and preclinical diagnosis is pointed out.

While the effectiveness of the treatment of syphilis is greatest at the time of the primary lesion and recedes progressively as time and systemic involvement go on, even in the late cardiovascular complications cautious and persisting chemotherapy may relieve symptoms and prolong life. In otherwise hopeless cases of aneurism, surgical measures, such as distal arteriovenous anastomosis, may be attended by surprisingly happy results (McCarthy).

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APPARENTLY SPONTANEOUS ACUTE PULMONARY ABSCESS

Report of a Case

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In any large series of cases of pulmonary abscess reported in the literature various sorts of cases are observed (Heuer, Miller, Flick, et al.). Clinically one sees abscesses the symptoms of which are sudden, severe, and fulminating, others in which they are insidious and comparatively mild.

Although the abscess may develop from a variety of causes, some of the more common clinical conditions antedating pulmonary abscess are wounds of the lung, acute respiratory infections including pneumonias, aspiration of metallic and other foreign bodies, malignant disease of the esophagus, bronchi and lungs, acute surgical infections associated with septicemia, peritonitis, hepatic and subphrenic abscess and surgical operations. Of these, surgical operations, especially on the upper air tract and particularly tonsillectomies, foreign bodies lodging in the bronchi and pneumonias are at present considered the causes of the greatest number of pulmonary abscesses (Norris and Landis).

In spite of these many antecedent clinical conditions the exact mode of onset of the abscess area is always open to question, and considerable controversy can always be found concerning the mode of entrance of the infecting organism. Whether it is due to direct implantation of the infecting organism into the lung, to septic embolism, to lymphatic extension or to any combination of these is always an interesting problem but one that has no great value or prognostic significance. The main interest in the matter appears to be centered chiefly about aspiration and septic embolism, because they seem to be the modes of entrance of the infecting organisms into the lung in postoperative pulmonary abscess.

Considerable experimental work has been done to determine which mode of entrance, aspiration or septic embolism, is the usual one in man. The results of this work have been to establish two different schools, one leaning toward aspiration and the other toward septic embolism.

Flick and his co-workers are of the opinion that the acute respiratory lesions considered as antecedent to the occurrence of abscess of the lung probably represent variations in the severity of the initial manifestations of the pyogenic infection. Occasionally one encounters a case in which the widespread pyogenic infection produces an acute onset, and the diffuse character of the pulmonary lesion grossly resembles lobar pneumonia. Later, with localization and distinct abscess formation, the sequence of events may easily be misinterpreted as abscess complicating or following lobar pneumonia.

Lord does not think that any lung abscess forms as a result of an accident of resolution in pneumonia but that it is an independent affection due to aspiration of putrefactive organisms. In his series of 227 cases possibly 28 cases (12.3 per cent) followed bronchopneumonia but none followed lobar pneumonia.

As previously stated, abscesses the symptoms of which are sudden, severe, and fulminating are encountered, but usually a history of infection or surgical operation can be elicited preceding the abscess formation.

Spontaneous acute pulmonary abscess apparently is very rare. Etienne and Louyot mention three cases which were apparently spontaneous, but no further report is made of them. I wish to report the following case because as far as I have been able to determine it is unique and tends to support my belief that spontaneous acute pulmonary abscesses can occur, although very little can be found in the literature concerning such cases.

Report of Case

The patient, a white girl, aged 8 years, was admitted to Georgetown University Hospital May 24, 1932, in a stuporous condition with staring eyes and dilated pupils. The history given by the father and mother is believed to be reliable. The day before admission the patient appeared to be well and nothing unusual in her activities was noted. She retired at 8 p.m. as usual. One hour later she complained of being sick, vomited and had a severe chill. At 10:30 p.m. she went to the bathroom at which time the father first noticed that she felt feverish. At 11:30 p.m. she took a drink of water. She then said she felt fine, and fell asleep. The following morning she felt better but did not care to get up or go to school. Between 11 o'clock and noon she became delirious. At 2 p.m. she had a convulsion, following which she remained stuporous. A short time after another convulsion occurred and the patient remained stuporous up to the time of admission to the hospital at 5:30 p.m. Physical examination showed the patient stuporous with staring eyes and partly dilated pupils. The knee jerks were exaggerated. Otherwise the physical examination was entirely negative. A half hour after admission she had another convulsion. She remained quiet for the next 20 minutes and then became extremely restless, thrashing about in bed. Ether inhalation would not quiet or relax her; she groaned continuously. Ten minutes later mucous rhonchi were heard in the throat. Breathing stopped. Artificial respiration and oxygen were of no avail. Cyanosis developed and heart action ceased several minutes later. The impression clinically was that the convulsions were of toxic origin from the gastro-intestinal tract. The only important finding at the necropsy was in the left lung. The lung was pinkish-gray and contained normal crepitus in the upper lobe, with a normal pinkish-red appearance on section. On the lateral aspect of the lower lobe was a firm, red, elevated area about 5 cm. in diameter, which on section was found to extend into the lobe for about 6 cm.; the cut surface of this area was dark red and contained no froth or fluid on pressure. A red zone about 2 mm. in thickness was present around the periphery of the entire area which permitted the area to appear fairly well circumscribed and separated from the surrounding tissue. A fibrous wall was not found around this area. There was no visible necrosis grossly, but the entire area appeared coagulated and gelatinous. The remainder of the lobe around this area appeared to be fairly normal. A search through the vessels leading to this area failed to reveal any evidence of thrombosis or any foreign body in the distal bronchioles. The other organs which showed any change from the normal were the kidneys and the liver, which showed a moderate degree of cloudy swelling, and the spleen, which was enlarged, congested and conformed to the usual picture in toxemia. The microscopic examination confirmed the gross findings throughout all organs. The left lung in the region of what was believed to be an acute abscess shows a well defined area of dense leukocytic infiltration, in the center of which the alveoli cannot be recognized. All the tissue in the center appears to be undergoing early necrosis. Most of the infiltrating cells around the area are polymorphonuclear leukocytes and monocytes. Fibrous tissue is not present. The alveoli adjacent to this area appear to be empty and clear, although the alveolar walls in this area are thickened and contain many polymorphonuclear leukocytes and monocytes. Some distance away from this area the tissue appears to be quite normal.

Discussion

There is no doubt that a question can be raised as to whether I am justified in classifying the case reported here as one of spontaneous acute pulmonary abscess. However, with a history of acute onset and no history of antecedent infection or surgical operation, and in the absence of a foreign body in the lung at necropsy, together with a definite picture of an acute abscess on gross examination confirmed by microscopic examination, I am prompted to place the case in the category that I have chosen. It is difficult to conceive that a lung abscess could develop and produce death all within a period of less than 24 hours, but since no other history could be obtained I believe the case should be allowed to stand as such and death be ascribed to an overwhelming toxemia.

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(*Continued from July, 1932*)

RECENT ADVANCES IN THE PHYSIOLOGY OF SEX

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Our attention has recently been called to the importance of another hormone, that is, the male sex hormone, on which Professors Koch and Carl Moore of the University of Chicago laboratories have been collaborating. Doctor Koch, together with his coworkers, principally Gallagher,[23, 24] has succeeded in preparing a very active extract of the bulls' testes, which has been used by Professor Moore in carrying out his studies on the male sex hormone. Professor Moore has reinvestigated and elaborated six specific tests for determining the potency of the testicular extracts.[25, 26] They have to do, for the most part, with the effects of this extract on the accessory male organs of guinea pigs and rats. The best test worked out thus far, however, seems to be the assay of this testicular extract, using the capon. In this test one injects, for a series of days, a certain amount of the testicular extract, determining its potency by the amount of growth induced in the comb of the birds. At the Second International Congress for Sex Research, 1931, Koch, Gallagher and Womack[27, 28] presented much new material from their work. An interesting point in connection with their work is the finding that there seems to be a definite relation between the age of the animal from which these testes are taken and the concentration of the hormone in the testes. These workers find that "not only is the lipin content of calf testes higher than that of adult bulls, but that old bulls' testes are still lower in lipin content." Further, they were able to show that in the urine there is again a definite relation in the excretion of the male hormone in the urine and the age of the individual. Urine of boys under 10 years of age always gave negative results, regardless of the fact that quite large amounts were used. Boys from 14 to 20 years old excrete about the same quantity of the male sex hormone as do adult men.

Butenandt,[29] the same worker who shared honors in the isolation of the female sex hormone, announced recently the isolation in fully purified, crystalline form of the male sex hormone. His data seem to point to the fact that the two sex hormones, male and female, are closely related chemically. Whatever the application of the male sex hormone in clinical work, little is known at the present time. While it seems that there must be an application of this hormone, much careful investigation is needed to decide this point.

One of the most interesting studies in sex physiology in the past few years is that of Bissonnette, on the effect of light on male and female birds,[30, 31] and particularly, his most recent paper on the effect of light on male and female ferrets.[32] Reinvestigating older work by Rowan,[33] Bissonnette has found that definite wavelengths of light in the visible spectrum play a certain rôle in the control of the size of the sexual organs of the ferret, both male and female. It has been known for sometime that the ferret has a fairly definite breeding cycle,[34] from March to August, and that this animal will not breed outside of these months. Bissonnette has found that by properly treating these animals with these certain wavelengths of light he is able to bring the ferret, especially the female, into full sexual activity in the dead of winter. Bissonnette suggests that this activity is brought on, not through the direct effect of light upon the ovary or testes, but through the intervention again of the hypophysis. Additional work is needed to test this point, and these experiments will be carried out in the near future on hypophysectomized animals, probably the ferret and the English starling. It seems that the bird reacts to light in a much more efficient manner than the ferret and for this reason will perhaps be a better test object. Whatever the clinical application of Bissonnette's findings, there still remains the significant fact that, as earlier writers from Hippocrates on have intimated, light certainly plays a definite rôle in the metabolic activity of the lower animals. It is to be expected from the other effects of light on the human organism that in the sexual cycle it also plays an important part.

Human beings from earliest times have been interested in knowing just when ovulation takes place in their species, and when fertilization is most likely to occur. Earlier writers on this subject have postulated ovulation in almost every portion of the menstrual cycle from the first to the 28th day, some believing that it occurred in the first week, others from the 14th to the 19th day, and still others during the period of the menstrual flow itself. Even today the majority of gynecologists, and certainly the laity, believe that fertilization can occur at almost any portion of the menstrual cycle. During the past few years, however, several papers have appeared, the contents of which would seem to make it highly probable that ovulation in the human species occurs between the 9th and 18th days after the first day of menstrual flow.

Knaus has done the most work on this problem[35, 36, 37, 38] and maintains that in women, just as in most mammals, fertilization occurs at the time of the termination of the ovulation process. His experiments are done by recording the motility of the uterus with the balloon manometer system. He notes that before ovulation has occurred, the uterus is markedly responsive to injections of pituitrin. After ovulation has occurred, with formation of the corpus luteum, he finds that the uterus is no longer active or responsive to injections of pituitrin. Using these data as a basis for determining the time of ovulation, Knaus finds ovulation to occur normally in women with regular 28 to 30 day menstrual cycles between the 14th and 16th days. During the first 10 days of the menstrual cycle, therefore, and from the 18th day of the cycle on, Knaus postulates that a physiologic sterility exists. Knaus believes that in women with longer or shorter menstrual cycles the periods of conception capacity, and also of physiologic sterility, vary somewhat.

There is additional evidence to point to the fact that Knaus' theory is correct. Attention is called to the work of Pratt et al.[39] who were the first to study the human ova obtained from washings of the Fallopian tubes. They have confirmed the observations of Knaus that ovulation occurs more frequently at the middle of the intermenstruum.

With these findings should be mentioned the work of Hartman on the monkey. Hartman has found that in practically every case in which he has recovered the monkey ovum, this recovery has been made during the middle of the intermenstruum.[40] Hartman states "The conclusion that ovulation occurs at any time of the menstrual cycle is based on testimony which does not bear scientific scrutiny. The crucial evidence, however, is the recovery of the egg, now accomplished 6 times in the human and about 30 times in the monkey. In all these cases ovulation occurred between days 9 and 18 (counting the beginning of the flow as day 1). Furthermore, 60 ovulation days were determined by rectal palpation of the monkeys' ovaries. These all occurred between days 9 and 17. The average for man and monkey is about 14."

Knaus has done considerable work on the motility of the uterus, but by far the most important and far-reaching work is that of Reynolds, who has published a series of papers on this problem.[41, 42, 43] This worker succeeded two years ago in preparing a uterine fistula in the rabbit and carried out many experiments on the uterus in vivo in the unanesthetized animal. The important findings made by Reynolds point out very strikingly a lesson that should not be forgotten by researchers engaged in this type of experimental work, that we cannot draw conclusions wholesale from findings made on excised tissue, but that we should attempt more and more to investigate problems by means of technic which employs an unanesthetized animal. An important finding of Reynolds is that at estrus, instead of the uterus becoming less active (as had been shown with excised tissue), greater motility is actually assumed than at any other period of the estrus cycle. He has shown that this increased motility of the uterus at the time of estrus is due to the female sex hormone. There is certainly a decrease in motility after ovulation has occurred. Whether or not this decrease in motility is due to the presence of the corpus luteum it is too early to say, because, as Reynolds[43] has pointed out, adequate replacement therapy experiments have not been carried out.

I have had the opportunity of repeating some of Reynold's experiments and have corroborated them in every detail. It is interesting to note that in the rabbit in estrus one finds, even though apparently normal and mature follicles are present in the ovary, that there are nevertheless periods when the uterus is almost quiescent. Also, during these periods of quiescence one cannot elicit any effect with pituitrin. I have recently found that during the period of great activity of the uterus of the rabbit one can induce prompt and pronounced response with small amounts of intravenously administered adrenalin.[44] These adrenalin responses are abolished by ergotoxin, which is known to paralyze the sympathetic motor nerve endings. It is found that much more ergotamine is needed to paralyze the sympathetic nerve endings in the uterus and vagina than has heretofore been reported. The value of the in vivo experiments is shown again when we consider that here we get a distinct motor effect with adrenalin and cocaine and find no synergism between these two drugs, whereas in the in vitro experiments Rosenblueth found exactly the opposite effects. These experiments will be reported shortly.[45]

Some work has been carried out by the author in collaboration with Templeton[46] on the motility of the vagina of the dog, and it appears that the vagina of the dog does not react in the same way as does that of the rabbit uterus to female sex hormone. After many attempts I have also succeeded in establishing a patent uterine fistula in the dog. This work is still in progress and it is hoped that a report can be made shortly.

A word should be said concerning the clinical application of the sex hormones so far discovered. There is actually very little data bearing on the subject. The writer would mention the warning given by Frank.[47] According to him, there is no data to warrant the present widespread use of any hormone, female sex hormone, corpus luteum (progestin), or anterior pituitary hormone. Keeping in mind Frank's statement, I wish to refer the reader to several papers by competent workers in the field: "Effects of Female Sex Hormone on Conception," G. L. Kelley;[48] "Hormonal Sterilization of Female Mammals," Mandelstamm and Tschiakowsky;[49]

"Anterior Pituitary Substance in Treatment of Functional Bleeding," Novak and Hurd;[50] "Continued Use of the Female Sex Hormone, Effects on Reproductive Organ," Kunde et al;[51] "Female Sex Hormone and Sterility," Stein and Leventhal;[52] "Anterior Pituitary in Abnormal Menstruation," Smith and Smith.[53]

In this review it was of course impossible to cover much pertinent literature. There are many outstanding papers which could not here be considered, among which are those of Novak[54,55] on the physiology of menstruation, the work of Hartman and colleagues on the sexual cycle of the monkey,[56] and the important rôle of the anterior pituitary hormone in menstruation.[57]

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ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Fibrinopurulent Pericarditis, Report of An Unusual Case,"* by **George J. Brilmyer, M.D.**

The patient was a well developed man, 38 years of age, who was taken ill suddenly on November 29, 1931, with sore throat, severe headache, cough, general achiness, and a burning sensation in the chest. The temperature was 102°F. By December 4 the temperature had dropped to 98.4°F., with a pulse of 90, and respiratory rate of 20. He was coughing less and the sputum was scant. On December 5 he was so improved that he was given permission to be up and about his room, but he dressed and went across the street to his shop. The next day his temperature rose to 100°F., the pulse rate to 110, and the respiratory rate to 24. The cough became more troublesome. Slight impairment of resonance was noted at the base of the left lung. On December 8 at 4 a.m. the patient became very dyspneic, coughed incessantly, and had severe pain in the chest. A hypodermic injection of ¼ grain of morphia gave relief. By 10 a.m. the patient was quite comfortable, the temperature normal, and he had expectorated a large quantity of foul smelling, thick, greenish pus. Examination of the chest revealed dullness at the base of the left lung. The heart sounds were weak, the pulse rate was 120 and the pulse of poor quality, but the systolic blood pressure was 120. For the next 4 days the temperature remained normal or below normal, and the pulse was weak and rapid. There was considerable sweating, a profuse purulent expectoration, and cough on exertion. Pallor and weakness increased markedly. At noon, December 12, the patient was admitted to Sibley Hospital by ambulance. The temperature was 98°F., the pulse rate 84, and the respiratory rate 20. The urine showed a trace of albumen with hyalin, granular, and pus casts. The red cell count was 4,900,000 and the white cell count

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* Presented March 30, 1932.

33,500 with 95 per cent polymorphonuclears. An x-ray film showed the heart enlarged and possible abscess in the left lung. The clinical diagnosis was abscess of the left lung. By 8 p.m. the patient seemed improved, but at 4 a.m., December 13, cough became very troublesome, and the sputum became bright red. Codein relieved the cough but the bloody sputum continued to be expectorated. The temperature rose to 100.6°F., the pulse to 126, and the respirations to 33, and the patient became markedly cyanotic and drowsy. He died at 12:50 p.m. At necropsy the left pleural cavity contained a small amount of free fluid. The left lung was adherent to the posterior chest wall and to the diaphragm by fibrous adhesions; fibrinous adhesions bound the pericardium and pleura. The upper left lobe was crepitant throughout; the lower lobe showed a large degenerating hemorrhagic infarct, the periphery of which contained many small abscesses. The right pleural cavity contained no fluid; the right lung was free and showed only terminal hypostasis at its base. The pericardium was thick and distended. It contained about 100 cc. of straw-colored fluid. Upon reflection of the pericardium a markedly extensive pericarditis of the fibrinopurulent type was revealed with long yellowish-white strings of fibrin extending from the epicardial surface. The heart itself was not enlarged. Direct smears from the pericardium, stained by the Gram method, were literally packed with chains of streptococci which upon culture proved to be streptococcus viridans. The markedly thickened pericardium was completely lined with stringy yellowish-white fibrin as was the entire epicardial surface. The right atrium was rather thick-walled but there was no evidence of endocarditis. The tricuspid orifice admitted 3 fingers. The walls of the right ventricle were markedly infiltrated with fat, which was thickest along the subepicardial surface. There was no intramural thrombosis or endocarditis present, and the pulmonary artery and valves exhibited no gross pathology. The epicardium of the left atrium was crinkled and covered by the extensive fibrinopurulent exudate. The lining of this chamber was smooth and glistening; the mitral orifice admitted 2 fingers. The wall of the left ventricle was somewhat hypertrophied and the seat of toxic myocarditis. The mitral leaflets showed no fibrosis, there was no endocarditis, and the aortic valves were apparently normal. The coronary orifices were patent, and there were a few soft, early atheromatous plaques present in the aorta just above the coronary openings. The aortic wall was soft and resilient. Further anatomical findings were toxic hepatitis, an acute splenic tumor, and an acute glomerulonephritis. This case is presented for the following reasons: (1) The extensiveness of the pericarditis was striking; (2) direct smears revealed so many streptococci; (3) the case was of such short duration; and (4) there was no evidence of an associated endocarditis. Whether the primary source of the infection was in the tonsils, which became so acutely inflamed on November 29, or whether the pericarditis came from the infected infarct of the left lung after this area became abscessed is a question that cannot be answered for certain, but indications are that the infection was a direct extension from the infected lung.

Discussion: Drs. Joseph F. Elward and Worth B. Daniels.

"SUCCESSFUL BRACHIAL EMBOLECTOMY. REPORT OF A CASE,"* by **Fred R. Sanderson, M.D.**

The patient was a white woman, aged 50 years, who was admitted to Gallinger Municipal Hospital February 12, 1932, complaining of dyspnea and swelling of the ankles of one year's duration. The previous history was negative except for a fractured right hip several years ago and a thyroidectomy in 1920 with complete relief of symptoms. Physical examination revealed signs of congestive heart failure, with râles at both bases, auricular fibrillation, marked edema of the ankles and moderate cardiac enlargement to the right and left. The blood pressure was 170/80. Physical and laboratory examinations were otherwise normal. The diagnosis was hypertensive heart disease and coronary sclerosis. Treatment consisted of rest in bed, digitalization and diuresis. One day the patient noticed that the right arm and hand felt cool and ached. Pain in the arm was never severe. On examination the arterial pulsation was absent in the arm as far up as the junction of the brachial with the axillary artery. The hand and arm were cooler than the left, and the skin was blanched. Sensation and muscular activity were normal. At the site of the cessation of pulsation there was tenderness and pain on pressure and it was thought an elongated mass could be felt in the artery. About 9 hours after onset of symptoms the upper third of the right brachial artery was exposed under novocaine. A firm mass about 3 cm. long could be felt in the artery about 6 cm. from the anterior border of the axilla. Above the mass the artery was pulsating forcibly, while below there was no pulsation and the artery was collapsed. Incision was made over the mass and an embolus about 3 cm. in length was removed. After closure of the vessel, there was a strong radial pulse in the right wrist with normal color and temperature in the hand and arm. The convalescence was uneventful and the patient was discharged from the hospital 6 weeks after operation in relatively good physical condition and with normal circulation in the right arm and hand.

The first successful embolectomy was done by Labey in 1911 although many unsuccessful embolectomies had been done since the first attempt by Ssabanejew in 1895. To Key of Sweden we are indebted for the development of this field of surgery. In 1927, Pemberton stated that less than 20 successful operations have been reported for the United States, Canada and England. Since then reports have been more numerous, so that at present the total number of cases must be 250 or more. The common femoral artery is most frequently affected, followed in order of frequency by the common iliac, aorta, axillary, brachial and popliteal arteries; the remaining vessels are much less frequently involved. Emboli occur chiefly in cardiovascular disease. However, acute infections, surgical operations and parturition account for a small percentage of cases. Emboli are prone to lodge at points of narrowing in the artery such as a bifurcation or at a point of origin of a large branch. Secondary thrombosis rapidly takes place, extending peripherally to involve other branches. Complete obstruction to the blood flow followed by gangrene occurs rapidly unless the embolus is removed surgically. The symptoms of embolus are sudden severe pain in the extremity, numbness and disturbances of sensation. Pulsation in the affected vessel is absent, the extremity is cool and the color of the skin varies from a whiteness to a blotchy cyanosis; there may be disturbed motility and absent skin and tendon reflexes. In severe heart cases, symptoms of cardiac failure ensue. Early diagnosis, with immediate surgical removal of the embolus, is imperative for recovery and prevention of gangrene in the limb. If good results are to be obtained operation should be done within 12 hours after onset. Embolectomy under local anesthesia is the ideal operation. It is a simple procedure and requires few special materials. If probing is necessary to dislodge the clot, it should be gentle in order not to injure the intima of the vessel. An embolus at the bifurcation of the aorta usually extends down both iliac vessels and its removal is more difficult. In such a case both femoral arteries should be opened and the clot dislodged by means of a probe, reliance being placed upon the force of the blood stream to push the clot down to either opening in the femoral vessels. It may be necessary to expose the aorta extraperitoneally and milk the clot down to the opening in the femoral, as advised by Pemberton. If reestablishment of the circulation is impossible on account of injury to the intima of the vessel with secondary clot formation, the companion vein should be ligated at or more central to the site of obstruction, as it has been shown that there is less liability to gangrene if the vein is also ligated.

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* Presented March 9, 1932.

DISCUSSION

Dr. Wallace M. Yater: Arterial emboli always come from the heart except in those rare cases in which there is a patent foramen ovale. I had one such case in which a large embolus from a pelvic vein was caught in such an opening so that half of the embolus projected into each auricle and the patient was saved from occlusion of an artery by this means. Arterial emboli in most cases mean, therefore, serious heart disease. This may be vegetative endocarditis or congestive failure in any form of heart disease. In the case reported by Doctor Sanderson, which I had the privilege of seeing before operation, evidence of heart failure had been present for a year and a half. My opinion is that the cause of it was coronary sclerosis. The patient had been at complete bedrest and digitalized for a period of 3 weeks. She suddenly arose in the morning to close a window. At this time, undoubtedly, a piece of a mural thrombus which had formed at the site of a myocardial infarct became dislodged by the sudden increased activity of the heart. Local anesthesia was decided upon in this case because of the easy accessibility of the embolus. After operation the question arose as to whether the arm should be strapped to the chest to prevent motion, but it was decided rather to encourage the patient to move her arm in order to prevent the formation of a mural thrombus along the suture line. I wish to congratulate Doctor Sanderson upon his excellent work and in being one of the very few surgeons who has had the opportunity and privilege of successfully removing an embolus.

Further discussion participated in by **Dr. F. C. Fishback.**

"TRAUMATIC ARTERIOVENOUS FISTULA CURED BY OPERATION,"* by **H. H. Kerr, M.D.**

Although arteriovenous fistula has been known and studied for many, many years it is only comparatively recently that the effect on the heart of shunting the arterial blood into the venous circulation has been appreciated. Such a short circuit must be eliminated to prevent the advance of the cardiac symptoms. The ideal treatment of arteriovenous fistula is closure of the opening between the artery and vein with the restoration of the circulation in both vessels. Such treatment, however, is not often possible, and the symptoms have to be relieved by ligation of the vessels above and below the communication. I recently had the opportunity to operate upon a negro 40 years of age who had been shot through the thigh with a shot-gun many years before. He had developed an arteriovenous fistula, and when seen showed some enlargement of the affected leg, a loud bruit, palpable thrill over the thigh and some cardiac enlargement. His general complaint was relative to his cardiac condition which had incapacitated him. Under general anesthesia the femoral artery and femoral vein were exposed through a longitudinal incision above and below the anastomosis. The vessels were taped at the extremes of the incision, and then the region of the fistula was carefully dissected out, accompanied by ligation of all branches of both vessels. It was found that the artery and vein were so intimately bound together in the region of the communication that they could not be separated without danger to either or both vessels. The dilated vein was, therefore, opened by a transverse incision and the communication between the vessels sutured intravenously. When this was definitely proved to be tight by releasing the tapes on the artery, the vein was then closed by suturing and all tapes removed. The circulation was reestablished in both vessels with loss of the bruit and thrill, and the wound closed without drainage.

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* Presented at the Annual Meeting of the Society, May 5, 1932.

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'ETHICAL' QUACKERY

Every conscientious physician is an enemy of quacks. In the category of quacks are the various medical cultists and some 'out and out' unscrupulous physicians. Far more dangerous than these, however, is another group of medical men who may be designated 'ethical' quacks. These are physicians who, either unconsciously through ignorance or consciously for gain give advice to patients which is either detrimental to them or entails unnecessary expense. These men are a menace to the medical profession, since they are tolerated by high-minded physicians and therefore come within the pale of respectability. Conscientious physicians are too busy or too timid to deal properly with such 'ethical' quacks, and it is difficult to expose such men. These individuals place the medical profession in bad repute, inasmuch as their shortcomings, moral and otherwise, are credited to the profession as a whole.

The form of 'ethical' quackery due to ignorance is far more excusable than that variety practiced knowingly for gain. The former is perhaps the fault of our medical educational system, which allows incompetents to become medical practitioners. The latter is the fault of every right-minded physician who refuses to expose those members of the profession who are 'just slightly dishonest.' If one bold individual attempts to disclose the shortcomings of a colleague the chances are that he will be called jealous or spiteful, and his friends will attempt to discourage him from pressing the matter further. He will then become discouraged and cease to be interested in doing what he considered his duty, because it is distasteful and unfruitful.

Perhaps there are some who do not know what is meant by 'ethical' quackery. The surgeon who consistently rushes his patient at midnight to the hospital for an 'emergency appendix,' which always turns out to be 'catarrhal' appendicitis or chronic appendicitis is probably not entirely honest. The surgeon who operates when the patient is moribund is usually thinking only of the fee. The practitioner who calls daily for weeks without justification, and the specialist who has the patient return daily to his office for treatments (irrigations, iron injections, etc.) which he *knows* are of no value are both semi-quacks. The man who orders a great many unnecessary and usually expensive laboratory tests to impress the patient or hide his own ignorance is not right-minded. The doctor whose therapeutics comes from advertising pamphlets is not doing his duty by his patients, and he who fails to keep abreast of recent advances in the field of medicine is culpable. The physician who uses diagnostic methods which he is not qualified to use, the general practitioner who attempts to do surgical operations beyond his ability, and the man who will carry a serious case along, which he does not understand, without calling for consultation because he hopes for some piece of luck and fears his prestige might be lessened by admitting that he needs help, are all disloyal to the oath of Hippocrates. The 'pill doctor' who feels the pulse, looks at the tongue and prescribes when the case demands a careful examination is just as unethical as the real quack. The man who sees more patients in a day than he can treat properly is disloyal to his profession. The doctor who treats the psychoneuroses with pills alone because he can't take time to delve into the patient's personality is not a true physician. There are other ways of being 'ethical' quacks, but these examples will serve to show what is meant by this term.

Of course, human nature is difficult to change, and these men will always be among us, but the frown and the boycott are effective ways of dealing with such men and limiting their pernicious activities even when it is not feasible publicly to label them with their true name. Let us, therefore, begin to show these men that we know what they are; perhaps they have just enough self-respect to recognize the fallacy of their ways.

RECENT ADDITIONS TO LIBRARY

Mr. T. H. Vail Motter, son of the late Dr. Murray Galt Motter, has recently contributed to the Library a total of 46 volumes. Among these are some works written during the early days of the nineteenth century of which "A Treatise on Surgical Anatomy," by Abraham Colles is representative; also among other volumes is the "Medical and Surgical History of the War of the Rebellion," edited by Joseph K. Barnes. The Library Committee, through its chairman Dr. J. J. Mundell, wishes to express its appreciation and the thanks of the Society for these valuable additions; also its appreciation for an extensive contribution to the volumes in the Library recently made by Dr. W. Sinclair Bowen.

FLORENCE CRITTENTON HOME

MODERN HOSPITAL FACILITIES

The Florence Crittenton Home now operates a fully equipped hospital. In wide contrast to the facilities that were offered a few years ago by this institution is the thoroughly modern hospital located on Conduit Road, for the care of babies and the obstetrical care and surgical emergencies that may arise in their mothers. A former necessary plan involved the removal of sick babies and mothers with the exception of normal obstetrical cases to the hospitals of the City away from the peculiar environmental situation recognized by the Home Management as being of considerable value. Dr. J. B. Gregg Custis is chief of staff. As a field for the study and development of pediatrics the Florence Crittenton Home affords abundant opportunity. Dr. Louise Tayler-Jones is in charge of the pediatric work. Studies made in this institution have been made the basis for papers of merit. Through an adopted policy a larger percentage of infants are breast fed than those babies born in many other institutions. Social service work at the institution is not neglected. Available to employers are well-trained baby nurses, home workers and young women trained as typists and general office workers. It may be said that the facilities and personnel are at hand for promotion of that character of service to best advantage for which the Florence Crittenton Home has been noted.

A summary of activities for 1931:

PEDIATRIC	Average daily census: Children over 2 years, 5; under 2 years, 35.
OBSTETRIC	Deliveries: 40, including 3 Cesarean sections. There was no maternal mortality. One infant death.
SURGICAL	Major operations, 18.

Attending Staff—J. B. Gregg Custis, Chief

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MARYLAND HEALTH COMMITTEE APPOINTMENTS INCLUDE MEMBERS OF THIS SOCIETY

An Advisory Committee to cooperate with the Montgomery County, Maryland, Health Department was appointed recently. Dr. Benjamin C. Perry, member of the State Board of Health, is chairman. Among the members are listed Dr. V. L. Ellicott, County Health Officer, Dr. J. W. Bird, Chief of Staff, Montgomery County General Hospital, Dr. C. E. Waller and Dr. H. H. Howlett who is president of the Montgomery County Medical Society.

FAIRFAX COUNTY, VIRGINIA, MEDICAL SOCIETY ELECTS OFFICERS

President, William P. Caton, Accotink
Vice-Presidents, Jessie Scott, Vienna
Tracy Nolan, Cherrydale
Secretary, A. L. Carson, Falls Church
Treasurer, F. M. Brooks, Falls Church
Delegate to State Medical Society, C. A. Ransom, Falls Church

Present as guests at the meeting which was held at the residence of Dr. Ernest C. Shull, of Herndon, were Drs. Stuart O. Foster and Miles P. Omohundro of Washington.

SUCCESS ON RIFLE RANGE

Dr. Walter R. Stokes, an active member of the Medical Society of the District of Columbia, took first honors with one point less than a perfect score at Seagirt Tournament. He was shooting as a member of the Medical Detachment, 121st Engineers, District of Columbia National Guard.

CANDIDATES FOR PRACTICING IN DISTRICT OF COLUMBIA PASS EXAMINATIONS

Under the Healing Arts Practice Act adopted in 1929, the following 27 candidates were named as being successful in passing both the examination in basic sciences and the examination to practice medicine and surgery:

Robert Meston Bolton, Henry Arthur Callis, Charles Troll Carroll, William Heman Clements, William DeKleine, Herman Eisenberg, Edward Thomas Gary, Cyrus Martin Gormley, Holland Harvey Green, Stafford Wendell Hawken, Frank Stephan Horvath, Richard Stephen Hulburt, Peter Douglas Johnson, Richard Paul Johnson, Emmett H. Markwood, Wilbur Wynn Martin, Christopher Allen Mason, Richard Vinton Mattingly, Claudius Frank Mayer, Michael Joseph McInerney, Beveridge Miller, Howard Marshall Payne, William Titus Sichi, Allan Elicott Walker, Jr., Ernest Edward Walkes, Harry Samuel Weitzman, George Parker Wyman.

BOOK REVIEW

In Memoriam. The Medical Department of the United States Army in the Word War, Volume I Supplement, Army Medical Bulletin No. 27, published at the Medical Field Service School, Carlisle Barracks, Penna.

In preface we find: "A nominal list of deaths which occurred among the commissioned personnel of the Medical Department was published in Volume I, 'The Medical Department of the U. S. Army in the World War.' Since that list was prepared, it has been necessary to make a number of changes in it. Consequently, it seems desirable at this time to publish a corrected one and to add to it the names of the members of the Army Nurse Corps who died in service during this period. The list of the commissioned officers in its present form was prepared by Lt. Col. Charles W. Ayars, Sanitary Reserve Corps, and that of the Army nurses by Major Julia C. Stimson, Superintendent, Army Nurse Corps. The names of all who died from any cause while in active service between April 1, 1917 and June 30, 1920 are included. The account of the 'Earliest American Casualties' is from an article by Major General Robert U. Patterson, Surgeon General, U. S. Army (then Lt. Colonel), which was printed in 'The Military Surgeon' in October, 1925. General Patterson was Commanding Officer of U. S. A. Base Hospital No. 5 when it went overseas in May, 1917, and was also in command when the casualties occurred in that unit on September 4, 1917."

The memorializing of the deaths in the Medical Department inclusive of the Army Nurse Corps would seem desirable. The retold authoritative description of the first American battle casualties is revealing. Members of the Medical Department were first in this chronological list. Captain Louis J. Genella, M. R. C., U. S. A. July 14, 1917; Miss Beatrice M. McDonald, Army Nurse Corps, August 17, 1917; Lieut. Philip M. Stimson, M.C., U. S. A., September 4, 1917. The compilation presented in this Bulletin is well worth while.

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VALUE OF THE "PRESUMPTIVE" KAHN REACTION

TOMAS CAJIGAS, M.D.
Washington, D. C.

The "presumptive" Kahn test is one of several methods evolved by Kahn for the serum diagnosis of syphilis. The most important of these methods is the "standard" Kahn reaction which has attained wide use throughout the world and is generally looked upon as the method by which others are judged. The "standard" method has undergone two supreme tests during recent years. At two competitive serological conferences arranged by the League of Nations Health Committee, this method proved superior to the different Wassermann and precipitation methods tried. One of these conferences was held at Copenhagen in 1928 and the other in Montevideo in 1930, and the official League of Nations' report of this last conference contains on page 17 the following sentence:

> "The majority of serologists taking part in the Montevideo Conference agreed that, in the hands of Professor Kahn himself, the Kahn 'standard' test, which (as was the case also at the Copenhagen Conference) proved to be absolutely specific and extremely sensitive, was the best of those demonstrated at the Conference."

These facts are mentioned regarding the "standard" test because the superiority of this method, when correctly carried out, is sufficiently outstanding to have greatly impressed clinicians; so much so, that relatively little thought was given to the additional methods evolved by Kahn for the purpose of supplementing the "standard" test. I became interested in the "presumptive" test several years ago and from the very beginning was impressed with its value to clinicians as an additional method for the laboratory diagnosis of syphilis.

The "presumptive" test is considerably more sensitive than the "standard" Kahn reaction and not quite as specific as that reaction. During my early experiences with the "presumptive" test, I was under the impression whenever this test was positive in a given case but the "standard" Kahn as well as Wassermann tests were negative, that the case was probably not syphilitic. On investigation, however, I invariably found during those early days that the blood serums and spinal fluids that gave positive reactions only with the "presumptive" test, came from patients who were syphilitic. Let me illustrate by citing three of those early cases.

Case 1: This case was referred to me by one of our leading syphilologists. The patient's vision was failing. The blood Wassermann and "standard" Kahn tests were negative. The spinal fluid Wassermann test was negative. The spinal fluid "standard" Kahn test was very weakly positive. The "presumptive" Kahn test on the spinal fluid was strongly positive. The patient was not considered syphilitic, but on the strength of the strongly positive "presumptive" test, antisyphilitic treatment was instituted. The results were remarkable. The patient at once began to show improvement, and at present there is no question but that we were dealing with a case of neurosyphilis.

Case 2: A blood sample was sent to me for a serological examination. The Wassermann and "standard" Kahn tests were completely negative, but the "presumptive" Kahn test was strongly positive. I immediately communicated these findings to the physician and pointed out that my experience with the "presumptive" test was too limited for me to express an opinion as to its specificity. But the physician informed me that it was an old, treated case of syphilis.

Case 3: "Standard" Kahn and Wassermann tests of the blood were completely negative, but the "presumptive" Kahn test was four plus. On clinical investigation it was found that the patient had contracted syphilis about 20 years before, and 3 years before was actually treated for neurosyphilis until the serology was negative. The patient complained of lightning pains and extreme weakness of both legs. A spinal fluid examination showed strongly positive reactions with all methods. It is evident that the positive "presumptive" test on the blood was a significant reaction.

These and similar cases led me to establish the "presumptive" Kahn test as a routine procedure in my laboratory, in addition to the "standard" Kahn and the Wassermann tests. I believed that what clinicians needed was a test to help them detect as many cases of syphilis as possible, and after three years of practical experience with the "presumptive" test, its clinical value has greatly grown in my estimation.

In this article, I shall briefly summarize my experiences with the "presumptive" test during approximately the past year, with 1,387 cases. Before presenting these data, I should like to state that two workers have recently reported on extensive studies with the "presumptive" test. McDermott reported on 15,000 "presumptive" tests compared with the "standard" Kahn test on blood serum. This worker found the "presumptive" test to be more sensitive by 2 per cent than the "standard" Kahn test in the general run of hospital cases, and more sensitive by 26 per cent in treated cases of syphilis. In a comparative study of 1,300 spinal fluid Kahn tests, the same worker found the "presumptive" test to be more sensitive by 12 per cent than the "standard" Kahn test in the general run of hospital cases, and more sensitive by 18 per cent in treated cases of neurosyphilis. These studies by McDermott were serological and the clinical conditions of the patients were not presented. Of special interest is a clinical study of the "presumptive" reaction compared with the "standard" Kahn test reported by Davenport. He showed that the "standard" Kahn reaction with spinal fluid, while specific for neurosyphilis, occasionally gave a negative reaction in the presence of this clinical condition. Thus in 118 untreated cases of neurosyphilis 2 negative "standard" Kahn reactions were obtained, and in 1,369 treated cases of neurosyphilis 23 negative "standard" Kahn reactions were obtained in patients who required further central nervous system therapy. Turning to the "presumptive" procedure, however, of 115 positive reactions obtained in a group who had not received treatment for neurosyphilis, 13 were obtained in syphilitic patients who showed no clinical evidence of neurosyphilis. In other words, all positive spinal fluid reactions given by this method were cases of syphilis, and it may indeed be that this test gives the earliest indication of neurosyphilis available today, long before there are clinical manifestations of this condition. With regard to treated cases of neurosyphilis, Davenport reports 30 positive spinal fluid reactions in patients who clinically required no further therapy for the central nervous system, and four negative reactions in patients for whom, although apparently they were well and at work, some further therapy was thought advisable as a factor of safety. In short, the "presumptive" spinal fluid test seemed to be far more sensitive than the "standard" Kahn test both in untreated and in treated cases of neurosyphilis.

During the past three years, I have been employing the "presumptive" test as a routine procedure on all serums and spinal fluids submitted for serological examination. In view of the fact that I use also the "standard" Kahn test as well as a Wassermann test with two antigens (the Noguchi and the cholesterolized), I was able to compare the "presumptive" with the other serological methods. In addition, whenever the "presumptive" was positive and the other methods negative, attempts were made to communicate with the clinician who submitted the specimen to determine whether or not the positive findings fitted in with the clinical picture.

Table 1 presents evidence of the increase in sensitivity of the "presumptive" "Kahn test over the "standard" Kahn and Wassermann tests in a group of 1,387 cases. Of this number, 226 were strongly positive by all methods. Forty cases gave strongly positive "presumptive" tests, moderately positive "standard" Kahn reactions and weaker Wassermann tests. Thirty-seven cases gave strongly positive "presumptive" tests, weakly positive "standard" Kahn reactions and negative Wassermann tests.

Eighty-two cases gave strongly or weakly positive "presumptive" reactions and negative "standard" Kahn and Wassermann tests. The remaining 1,001 examinations were negative by all methods.

An analysis of the 82 cases that gave positive reactions only with the "presumptive" test is of special interest. Fifty-four patients in this group were undergoing treatment for syphilis. Seven were untreated cases diagnosed as syphilis, 5 of which were in the primary stage and showed positive dark-field findings. With regard to the remaining 22 cases, I have been unable to secure definite data as to the presence or absence of syphilis.

and negative by the "standard" Kahn and other methods. In diagnosis, if there are clinical symptoms or a history of infection, the positive "presumptive" test should be sufficient serological corroboration to establish the diagnosis and to institute treatment. If there are no clinical symptoms and the history is negative after careful search, the clinician may not be justified in telling the patient he has syphilis, but he would be amply justified, in my opinion, in keeping the patient under observation or in giving him a therapeutic test.

In treated cases the "presumptive" test is more sensitive by about 25 per cent than the "standard" Kahn test; and since this test is considerably more sensitive than the Wassermann test, as shown by the League of Nations' Conferences, the increased sensitivity of the "presumptive" Kahn test over the Wassermann test must exceed this figure. Clinicians often ask me if treatment should be continued when patients give negative "standard" Kahn and Wassermann tests but positive "presumptive" tests. In such cases it is always well to keep in mind that it is the patient that is being treated and not the serum. In other words, the patient should be kept under observation; but with regard to further treatment, that depends on a number of factors, such as the patient's age, his

TABLE 1

INCREASE IN SENSITIVITY OF "PRESUMPTIVE" KAHN TEST OVER THE "STANDARD" KAHN AND THE WASSERMANN TESTS IN A GROUP OF 1,387 CASES

NUMBER OF CASES	"PRESUMPTIVE" KAHN TEST	"STANDARD" KAHN TEST	WASSERMANN TEST
226	+++, ++++	+++, ++++	+++, ++++
40	+++, ++++	++, +++	+, ++
37	+++, ++++	+, ++	–
38*	+++, ++++	–	–
44*	+, ++	–	–
1,001	–	–	–

Per cent Positive by all Methods	19
Per cent Negative by all Methods	72.5
Per cent Positive by "Presumptive" and "Standard" Kahn and Negative by Wassermann Tests	2.7
Per cent Positive by "Presumptive" Kahn and Negative by "Standard" Kahn and Wassermann Tests	5.8

* Of this group of 82 patients, 65 per cent (54 cases) represent patients under treatment; 8 per cent (7 cases) were diagnosed as syphilis—5 patients in this group were in the primary stage with positive dark-field findings; 27 per cent (22 cases) were undetermined, definite data as to the presence or absence of syphilis not having been obtained.

It is evident from these data that the "presumptive" Kahn test is not only highly sensitive in detecting syphilis but is apparently also highly specific. Approximately three-fourths of the patients that showed positive "presumptive" tests and negative "standard" Kahn and Wassermann tests were proved to be syphilitic. The remaining one-fourth I have not had an opportunity to investigate, but it is reasonable to believe that many if not all in this group were probably syphilitic.

The question arises as to what should be the clinical interpretation of serologic reactions that are repeatedly positive by the "presumptive" test clinical condition and the amount of treatment he has already received.

CONCLUSIONS

1. The "presumptive" Kahn test is an extremely sensitive method for the detection of syphilis.

2. In nearly 1,400 examinations the "presumptive" test was found to be more sensitive by 8.5 per cent than the Wassermann test and more sensitive by 5.8 per cent than the "standard" Kahn test.

3. The "presumptive" test appears to possess also a high degree of specificity and furnishes a valuable addition to the "standard" Kahn and Wassermann tests in the detection of syphilis.

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REPORT OF 839 CONSECUTIVE CASES OF APPENDICITIS WITH REFERENCE TO A NEWER METHOD OF TREATMENT*

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Appendicitis is such a threadbare subject that one hesitates to discuss it before an audience composed of members of this Society and their guests. However, because nearly an even hundred people die in the District of Columbia of this disease each year, and because there are many more left with disabling sequelae such as hernias, recurrent obstruction, etc., I believe that there is justification in bringing before you a new method of treatment that will lessen the mortality, the morbidity and the sequelae.

The 839 cases treated by this new method are classified as follows:

NUMBER OF CASES	NUMBER OF DEATHS
Acute, 550	0
Ruptured, 123	1 (cerebral embolism 1 hour after operation)
Chronic, 166	0
Acute ruptured appendicitis and acute ruptured tubal pregnancy, 1	1 (pulmonary embolism 9 days after operation)
Appendiceal abscess of 12 days' duration and acute cholecystitis with cholelithiasis, 1	1

This makes a total of three deaths in 839 cases, a little more than one-third of 1 per cent. When one remembers that 123 of these were cases of ruptured appendicitis, then one will appreciate the low mortality. It is more striking when it is recalled that there is much talk recently of the increasing mortality of appendicitis. Previous to the adoption of this method, my mortality was somewhat less than $2\frac{1}{2}$ per cent. These patients were referred by a number of physicians. Their ages varied from 3 to 81 years. They represent a cross section of social life.

In the case of the patient who died of cerebral embolism this accident occurred one hour after operation, and death followed six hours later. The temperature reached 109.5°F. by axilla. While this was a case of ruptured appendicitis, the patient was a vigorous woman, 30 years of age, who was expected to make an uneventful recovery.

The second death occurred in the case of a man past 50 years of age who was a moderate alcoholic. He had been ill for 12 days before operation. There was a large abscess near the mid-line. Four days after operation his condition was satisfactory, although he had had a rather stormy time. The fifth day there was an acute abdominal crisis, that is, pain, distention, vomiting, rapid pulse, etc. Death took place on the sixth postoperative day. At autopsy peritonitis was not found, but there was a stone blocking the cystic duct with a large, distended gall bladder, showing acute inflammation.

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* Read at the Annual Meeting of the Society, May 4, 1932.

In the third case the patient had been ill 3 days with both acute ruptured tubal pregnancy and acute ruptured appendicitis. She was making a good recovery until the ninth postoperative day when she died suddenly of pulmonary embolism. This was a very obese patient and the preoperative diagnosis was ruptured tubal pregnancy. A large mid-line incision was made necessitating stitches to prevent eventration.

The operative procedure used in this series was as follows: The incision is from $\frac{1}{2}$ of an inch to $1\frac{1}{2}$ inches in length; the latter length is used only in very obese patients, and only three times in these 839 cases was it necessary to enlarge the incision. It is usually made over the lower right rectus. The rectus sheath is opened and the muscle displaced toward the mid-line and held by a narrow retractor. The 12th intercostal nerve is not cut but is displaced upward or downward. If the appendix is ruptured the peritoneal cavity is cleansed either with soft gauze sponges or by a suction apparatus; then the peritoneum is closed with a purse-string suture of fine chromic catgut. The remainder of the wound in ruptured cases is packed tightly with iodoform gauze. The appendix is removed in all cases, except in those rare instances when the abscess can be drained without opening the general peritoneal cavity; then simple incision with drainage of the abscess is done. The stump is not inverted in acute cases, and rarely in chronic.

The points I wish to stress are: (1) the small incision, (2) the tight closure of the peritoneum without any attempt at drainage of the peritoneal cavity, (3) the leaving open of the remainder of the wound. The latter is packed with iodoform gauze which is not removed until the fifth or sixth day. It is replaced by plain gauze, lightly packed and changed daily.

If the wound is properly cared for, there will be no pus and no odor at any time during convalescence. There were three exceptions to this; in these cases there was leaking from the peritoneal cavity with wound infection. These were very severe cases. The patient may be out of bed the sixth or seventh day, and all but the exceptional case home by the eighth day. The method of dressing is carried on at home until healing is complete.

Thus the "ruptured case" is usually but a few days longer in the hospital than the "clean case," whose wound, of course, is sutured. There have been no postoperative hernias. There were three cases of pelvic abscess and in one of these intestinal obstruction developed. All recovered. These were fewer complications than in my previous series.

Salt solution was used intravenously in the bad cases in large quantities. Morphine was used liberally for 48 hours. Nothing but water was given by mouth for 48 hours or more. Then solid food was given but no liquids. Abdominal distention was very rarely seen. I believe position in bed to be important; the patient is placed on the left side at first, and, although he is turned frequently, he is made to lie most of the time on his left side, thereby elevating the wounded area and improving circulation. These cases were operated upon immediately; that is, none was kept in the hospital and given conservative treatment previous to operation.

At the risk of being tiresome I wish to prolong this discussion sufficiently to give some of my reasons for believing in this method of treatment. The small incision, of course, meets with much opposition, because in late years we have heard so much said of the wide exposure and the thorough exploration, and that we are not to worry about the wounds because they heal from the sides and not from the ends. These teachings are the very things that are causing the increased mortality of appendicitis. The anterior abdominal wall is not just a boundary limiting our abdominal contents. It is a portion of a functional unity of muscles on which depend respiration, circulation and probably also the energy for the movements of the lower portion of the gastrointestinal tract. Surgical wounds destroy this muscular unity. Postoperative pneumonia, pulmonary atelectasis, thrombosis, embolism and intestinal atony are frequent complications following abdominal operations. Their occurrence seems to bear slight relation to the intra-abdominal procedure. I believe that the injury to the abdominal wall, which destroys its function, is the direct cause of many of these complications. It surely is a patent fact that an incision 1 inch long will not be as damaging as an incision 6 inches long.

In reference to the non-drainage of the peritoneal cavity, I believe that it is impossible, even if it were desirable, to drain it. The tubes merely act as foreign bodies, create many adhesions, and are the cause of occasional cases of intestinal obstruction. As for general peritonitis, it is a terminal event and does not take place until long after the blood has been infected. It is time for us to recognize this fact, and to realize that modern discussions of peritonitis are no more logical than the discussions stressing typhlitis and perityphlitis 30 or 40 years ago. The peritoneum is closed so that the patient will retain his abdominal fluids. The remainder of the wound is packed open without a single stitch, so that the patient will not get septicemia from the infection that would be pent up in suturing a fresh wound. I think that the distention, vomiting, fever and great pain that is suffered by the person dying of appendicitis is due primarily to septicemia, and that the septicemia most frequently occurs from the infected abdominal wound.

EASTERN TYPE OF ROCKY MOUNTAIN SPOTTED FEVER

Report of Four Cases

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Rocky Mountain spotted fever, until recently thought to occur only in the West, has been recognized in the eastern part of the country in the last few years. These cases have not been numerous, but as experience has grown more cases have been diagnosed. Inasmuch as patients from nearby districts are being treated in Washington, the cases to be reported may be of value to local physicians as examples of the disease which they may at any time encounter.

The disease as it occurred in the Rockies was elaborated by Ricketts, King, McCalla and Maver between the years 1906 and 1911. It was shown to be caused by a virus and transmitted by the wood tick. Characteristic lesions are demonstrable. In the West the mortality is high. During the past three years there has apparently been an increase in the incidence of a febrile disease in the eastern states resembling both typhus fever and Rocky Mountain spotted fever, usually diagnosed typhus fever. It was not until 1930 that Rumreich, Dyer and Badger of the United States Public Health Service clearly differentiated these diseases and showed that spotted fever occurred as a definite clinical entity in this part of the country. This disease, which apparently has existed in the East for years but has been unrecognized, is designated the eastern type of Rocky Mountain spotted fever. In the next issue of the Annals the epidemiological, etiological and morphological features of the disease will be discussed by Doctor Rumreich.

Report of Cases

Case 1: The patient, a white woman, aged 35 years, was admitted to Georgetown University Hospital from Bowie, Maryland, on July 23, 1932, in what appeared to be a very critical condition. She was known to be about 2 months pregnant and had had some vaginal bleeding for 4 days. There had been 3 previous miscarriages. Attempts to cause abortion were denied. At first, in view of these features and the fever, it was thought a septic abortion was the cause of the illness, and that the rose-colored maculopapular rash was due to septicemia of this origin. The patient was irrational and prostrated. The conjunctivae were injected. There was slight tenderness in the hypogastrium, a slightly enlarged uterus (rectal examination) and some vaginal bleeding. The temperature was 104°F. and the pulse rate 90. The hemoglobin was 80 per cent (Dare), the erythrocytes numbered 4,000,000 per cu.mm. of blood and the leukocytes 8,600 with 82 per cent polymorphonuclear neutrophiles. The Kahn test was negative. A transfusion of 500 cc. of blood was given on general principles, after which the patient seemed somewhat improved. During the night a small fetus was expelled. The following morning the temperature was 99°F. and the patient less irrational. During the afternoon, however, the temperature rose again to 104°F., and the rash, which before had been confined mainly to the distal halves of the extremities, became more prominent and spread over most of the body. Many of the macular lesions on the right wrist and forearm had become petechial after the application of the tourniquet for the transfusion, but now petechiae were present on all extremities. The delirium increased and alternated with stupor. On the second morning after admission there was a remission in the fever of 2°F. The character and distribution of the rash at this time reminded the writer of that of cases of Rocky Mountain spotted fever which he had seen. The presence of this rash, the mental state of alternating delirium and stupor, the conjunctival injection, the absence of a frank pelvic peritonitis and the possibility of the abortion being a complication and not a cause of her illness made the diagnosis very probable. The following history was now obtained from the husband: The onset of the illness occurred on July 15, at which time the patient complained of weakness, headache, generalized muscular pains and a feeling as if she had "grippe." She remained out of bed the next day and took castor oil. On July 18 a rash was first noticed on the legs and feet, the husband describing it as "red spots;" later it was noticed on the hands. On July 20 the vaginal bleeding began. The family physician was summoned and the temperature found to be 104°F. On July 21 she became irrational and remained so most of the time. A tick had been removed from the calf of the right leg about July 11 or 12, and the resultant lesion was present at the time of admission. The history of tick-bite had been related to the hospital intern on admission, but it was not included in his admission history or considered as being relevant to her condition. The Weil-Felix reaction done in the hospital on July 26 and that done at the United States Public Health Service Laboratory on July 27 gave a complete agglutination in a dilution of 1:20. The clinical diagnosis at this time was confirmed by Public Health authorities. The further clinical course was as follows: Defervescence occurred by lysis with morning remissions of several degrees, and on the sixteenth day of illness (8 days after admission) the temperature was normal for the entire day. After this, there were occasional elevations of a degree or less, and on August 11, following the withdrawal of 200 cc. of blood from the patient to give to a second patient who was extremely ill at the time, there was an elevation again for several days. Nothing was found to account for this recrudescence. Her general condition gradually improved after the fourteenth day. The sensorium cleared slowly, however, the patient being disoriented and confused until the third week of her illness. Diarrhea began on the twelfth day and was troublesome for several days. The rash was most pronounced and most extensive about the tenth day of her illness (third day after admission), at which time it was present over the entire body except the scalp, a small area in the lumbodorsal region and the face, the latter being very flushed and having a dusky appearance. The lesions were thickest on the arms, hands, legs, ankles, feet and buttocks (Fig. 1). They were numerous on the palms and soles. At first they were rose-colored, maculopapular and faded with pressure; later they became petechial and purpuric. The rash was most pronounced in the afternoons when the fever was highest and faded somewhat with the morning remission. It began to fade about the second week, the lesions becoming first dusky purple, then light pink and finally yellowish-brown, disappearing first from the body and last from the extremities. Some of the purpuric lesions were still noticeable on the ankles during the fifth week as yellowish-brown spots. The conjunctival injection lasted throughout the second week. The nasal mucous membrane showed several small areas of ulceration about the tenth day and small petechial lesions were noted on the buccal mucous membrane about the same time. The tongue was dry and red during the febrile period. The lungs remained clear throughout except for occasional râles at the bases posteriorly. The pulse rate was not elevated in proportion to the temperature. Some tenderness was elicited in the upper right quadrant of

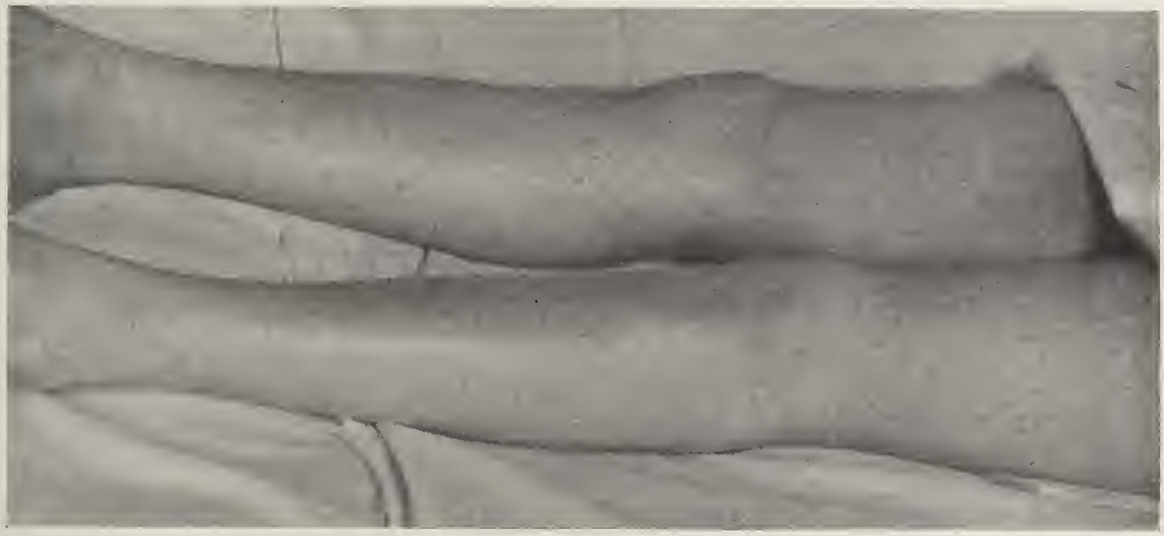

FIG. 1. PHOTOGRAPH OF LOWER EXTREMITIES IN CASE 1, SHOWING THE THICKLY PLACED MACULOPAPULES AND PETECHIAE

the abdomen from the eighth to the fourteenth day. Tenderness was noted over the region of the left kidney during the fourth week. The neck was slightly stiff during the second week. The general weakness persisted into the fifth week. The spleen was not palpable at any time. The hemoglobin slowly dropped to 60 per cent (Dare) and the erythrocytes to 3,120,000 per cu. mm. of blood in spite of two transfusions of 500 cc. of blood, but rose somewhat after a third transfusion. The highest leukocyte count was 10,500 per cu. mm. of blood, the lowest 5,100; the percentage of polymorphonuclear neutrophiles was about normal. The second Weil-Felix reaction, performed on August 1, the seventeenth day of the illness, showed complete agglutination to Bacillus proteus X^{19} in dilution of 1:80, and partial in dilutions of 1:160 and 1:320. Urinalyses showed some albumin, a few casts and some leukocytes.

Case 2: The patient, a white boy, aged 6½ years, entered Georgetown University Hospital from Chevy Chase, Maryland, on August 1, 1932, the fourth day of his illness. On July 29 he had complained of headache and had retired earlier than usual. The temperature, taken by the parents, was found to be 102°F. During the next two days the boy was very weak and complained of pains in the legs, arms and abdomen. On July 31 a rash was noted over the ankles, soles of the feet, hands and abdomen. This was not persistent and at times was scarcely visible. A slight 'head cold' had been observed. On admission the temperature was 105°F., the pulse rate 110. The child was conscious but drowsy; at times he was quite restless. The conjunctivae were injected and the face flushed. The neck was slightly stiff. The throat was normal. There was no rash. Heart and lungs were normal. Generalized muscular and abdominal tenderness was elicited. The spleen was not palpable. The reflexes were normal. A questionable Babinski was noted. The hemoglobin was 85 per cent (Newcomer), erythrocytes numbered 4,750,000 per cu. mm. of blood and leukocytes 11,200 with 90 per cent polymorphonuclear neutrophiles. Urinalysis and spinal fluid examinations were normal. The child's condition remained about the same for the next 4 days. The temperature varied from 102°F. to 105°F., being highest in the afternoon. The muscles were very tender and he cried with pain when moved about in bed. There was alternating delirium and mental apathy associated with irritability. The rash on the forearms and about the ankles reappeared and was more pronounced in the afternoons with the rise in temperature but did not appear striking because of the marked tan of the skin. There were small pinkish macules, which at first disappeared on pressure but after two days became petechial. Two or three 'rose spots' were noted on the abdomen. The application of a tourniquet to the arm caused the petechiae to become more prominent. On August 5, the eighth day of illness, a clinical diagnosis of Rocky Mountain spotted fever was made by Doctor Yater. On questioning, the parents gave a history of removing ticks from the child previous to his illness and on numerous occasions during the summer. The child was next seen by Drs. Dyer and Rumreich of the United States Public Health Service, who confirmed the clinical diagnosis. A Weil-Felix reaction done on the ninth day of the disease was positive with complete agglutination in a dilution of 1:320 and partial in agglutination in a dilution of 1:640. On the tenth day the patient seemed more toxic and the mental condition worse. He did not recognize his parents as he had done previously. He voided involuntarily and developed a marked watery diarrhea. Because he took fluids poorly by mouth, hypodermoclysis of 5 per cent glucose in saline was given. The rash became quite prominent and was present over all of the body except the face and scalp. The lesions on the abdomen and chest were small and of a dusky, cyanotic color, while those on the extremities were now frankly petechial. Numerous petechial spots were present on the soft palate, anterior pillars and buccal membrane. The conjunctivae were heavily injected at this time. The abdomen was very tender and slightly distended. Sedatives were necessary to keep the patient quiet. On the eleventh day the patient seemed weaker and was very drowsy. The rash was very prominent in the afternoon. The face was deeply flushed and the hands and feet were swollen, but there was no pitting edema. There was marked edema of the scrotum which appeared to be local rather than general. The urinalysis showed a few red blood cells, casts and albumin. The chest was clear. On the twelfth day the patient seemed about the same except that the sensorium was very cloudy. On the morning of the thirteenth day the patient had a sudden collapse following an alcohol sponge. He became very cyanotic with shallow respirations, and pulmonary edema rapidly ensued. The pulse was rapid and weak. The child became comatose. The general condition improved in the course of several hours after repeated doses of caffeine, atropine and other stimulants. The edema previously noted of the scrotum spread forward into the penis, and the entire body appeared swollen; there was marked puffiness beneath the eyes, and the hands were very definitely enlarged. Râles were audible throughout the chest. A small amount of 25 per cent glucose was given intravenously, and later 5 per cent glucose was given by hypodermoclysis. At noon the temperature was 106°F., the pulse 140 per minute and very weak. A transfusion of 200 cc. of blood was given, the blood being taken from the patient reported in Case 1, who was at that time convalescing. The temperature rose slightly after this but later dropped. The patient seemed better during the evening but still appeared critically ill, remaining comatose. On the fourteenth day the respirations were rapid and difficult. Examination of the chest showed a pneumonic process in the right lung, involving the middle lobe. The respirations, which had been around 30 per minute, were now 50 to 60 per minute. The rash was petechial on the forearms and hands. The scrotal edema was more marked. The urinary output was good but there was bladder retention. Small areas of necrosis of the skin were noticed over each malleolus and a large necrotic area was present on the buttocks. The temperature was 104°F. The pulse was rapid and irregular. About noon there was marked cyanosis, and the respirations were about 70 per minute. Definite improvement followed the use of an oxygen tent. Another small transfusion was given later in the day. The blood was obtained from an immune donor. Hypodermoclysis was not given again because of the danger of necrosis. The leukocyte count was 28,400 with 90 per cent polymorphonuclears. The Weil-Felix reaction now gave complete agglutination in a dilution of 1:5,120 and partial in a dilution of 1:10,240. On the fifteenth day the condition was very poor. The respirations during the morning averaged about 70 per minute. The pneumonic area had spread to the upper right lobe. The rash had faded except on the forearms, where it was hemorrhagic. Another necrotic area was noted on the right ear and similar areas on each heel. The swelling of the hands and feet was less but the scrotum was worse and almost necrotic. The child showed definite symptoms of cerebral irritation, with twitching and convulsive seizures, chiefly in the left extremities. The right pupil was larger than the left. The neck was not stiff. The temperature reached nearly 107°F. by rectum that evening, followed by a drop to 104°F. during the night. On the morning of the sixteenth day the patient appeared better. The pulse was slower and stronger, the respirations slower, and the edema less marked. Another small transfusion was given from an immune donor. During the afternoon the child grew progressively worse, however, and remained cyanotic even in the oxygen tent. The pulse was rapid and irregular again and at times not palpable. The left lung was congested. Death occurred early in the morning of the seventeenth day. A necropsy could not be obtained. Of interest is the fact that the playmate of this patient, a boy aged 7 years had a febrile illness of about 5 days' duration during the first part of the illness of his friend. There was headache, abdominal pain and vomiting at the onset, with a fever of 101°F. A rose-colored rash was noted by the mother on the abdomen on the third day. This boy had also been bitten by ticks. The Weil-Felix reaction gave a partial agglutination in dilutions of 1:10 and 1:40 on the ninth and eighteenth days after the onset of illness. It is possible that this was an abortive case of spotted fever.

Case 3: The patient was a white man aged 50 years. He had become ill on the evening of August 15, 1931, with malaise and general aching. The same day he had removed a tick from the anterior abdominal wall which had burrowed deep into the skin. The patient had felt tired for several days, but he attributed this to long motor trips to and from West Virginia. The general aching continued the next day, and a severe frontal headache developed. He was very weak. Some abdominal pain was felt; he became nauseated and vomited. On the third day he felt worse, became irrational and remembered nothing more of his illness until late in convalescence. On the fourth day a rash was noticed on his arms by his wife who described it as looking like a "heat rash." The temperature at this time was 104°F. He was admitted to the Emergency Hospital on August 21, the seventh day of his illness. The temperature was then 104.2°F., the pulse rate 110 per minute. He was very toxic, irrational, hiccoughing frequently, urinating involuntarily, and complaining of pains in limbs and abdomen. Positive findings were flushed face, marked conjunctival injection, pharyngeal redness, numerous moist râles, decreased breath sounds at the bases of the lungs, and generalized abdominal tenderness with some spasm. The reflexes were sluggish. A diffuse, dusky red, maculopapular rash was present over most of the body except the face, and was most marked on the extremities. The hemoglobin was 88 per cent, the erythrocytes numbered 4,570,000 per cu. mm. of blood and the leukocytes 16,300 with 91 per cent polymorphonuclear neutrophiles. The fever continued at 103°F. to 104°F. in the afternoons with morning remissions of 2°F. to 3°F., until the fifteenth day, after which it dropped by lysis, varying from 101°F. to normal until the time of discharge on September 12. The pulse was slightly slow in proportion to the temperature with several sudden but temporary increases. The patient was very irrational until the fifteenth day; he had to be restrained at times while at other times he was stuporous. The sensorium was clearer at the end of the second week but he was somewhat confused until the end of the third week. Incontinence of bladder and bowels existed during the second week, and he had to be catheterized for a considerable period. He was very toxic the first week in the hospital and had hiccough which persisted for 5 days in spite of all therapy. The neck was never stiff. The conjunctivae were inflamed for 3 weeks of the disease. The scrotum became edematous on the thirteenth day and subsided after several days. The lungs became clear after the second week. X-ray films taken on the ninth day showed slight increase in lung markings in the region of both bases, the appearance being that of early bronchopneumonia. On admission to the hospital on the ninth day the rash appeared as a dusky red, maculopapular exanthem over the extremities, buttocks, trunk, soles of the feet, and palms of the hands, but the face was clear. The lesions faded on pressure; they were most prominent on the tenth day and were most marked on the wrists, ankles and soles of the feet; they were then petechial in character. Fading began about the twelfth day, the lesions disappearing first on the legs and abdomen; but they persisted on the feet, and at the time of discharge on September 12, dusky brown spots were still present on the ankles which deepened in color after a bath or after walking.

Laboratory findings: The urine showed albumin and casts throughout the febrile period but was normal at the time of discharge. The Weil-Felix reaction on August 25 showed slight agglutination in dilutions of 1:20 and 1:40 (10 days of illness). On August 28 there was complete agglutination in a dilution of 1:1,280. The Widal reaction showed slight agglutination in a dilution of 1:80. The blood culture was negative. The highest leukocyte count was 20,500 about the middle of the illness. It gradually returned to normal. There were no sequelae. The patient made a rapid recovery after the third week. He gained 20 pounds in the first few months. He was seen a year later and his condition was fine. Blood was taken from him for another case. He lived in Bethesda, Maryland, and had frequently noticed ticks on his clothes and crawling up his arms while working in his yard. He had often removed ticks from dogs. There was a small lesion on the anterior abdominal wall at the time of admission, supposedly the site of a tick bite.

Case 4: The patient was a white woman, aged 50 years, whose illness began on December 9, 1930, with what appeared to be a fainting spell. The next day she complained of sore throat, was painful all over and was treated by her physician for grippe. On December 11 her temperature was 100°F. A maculopapular rash was noticed over the forearms at this time. The patient had a chill the same day and another the following day. She was very restless, unable to sleep, and complained of pains about the neck, chest and abdomen. The temperature on the fourth day was 103°F. On December 14 the throat looked normal, the rash resembled that of measles and the eyes were watery and injected. She was irrational in the afternoon. She entered Emergency Hospital on December 16, at which time the temperature was 104°F., the pulse rate 130 and the respirations 30. The patient was then rational but the attention was very poor. The speech was slightly slurred. The face was dusky, the conjunctivae injected, the tongue reddened and fissured, the posterior pharynx injected. A few small petechial spots were present on the buccal mucous membrane. There was slight enlargement of the cervical glands. The lungs were clear except for a few scattered râles. There was slight rigidity and tenderness over the right lumbar muscles. The reflexes were sluggish. The patient remained very lethargic for the first 2 weeks with occasional periods of delirium. She was not entirely clear mentally until the end of the third week. There were fine tremors of the face noted on the fourteenth and fifteenth days. The spleen was never palpable. The rash, first noticed by her physician on the third day, was measley, present on the forearms and shoulders, most marked in the afternoons, and faded with pressure; it became hemorrhagic early. The rash was most prominent and extensive about the eleventh day, at which time it was present on the arms, wrists, palms of the hands, legs, ankles, soles of the feet and buttocks, with a few scattered lesions over the chest and abdomen. There were no lesions on the face or lumbodorsal region. On the extremities the rash became petechial in character and hemorrhagic, while over the remainder of the body it was macular and rose-colored. The rash remained about the same for several days and then began to fade, persisting longest on the hands and feet. The temperature continued high with morning remissions of 1°F. to 3°F. until the fifteenth day, after which defervescence was by lysis, the temperature being normal for the first 24 hour period on January 2. The pulse rate ranged from 110 to 130. The leukocyte count on December 12 was 5,000 and on December 24, 17,900. The urine contained a faint trace of albumin and some casts throughout the febrile period. On December 23 the Weil-Felix test showed agglutination to be complete in dilutions up to 1:640. The patient in this case lived on a farm in Herndon County, Virginia. At the time of her illness a diagnosis of typhus fever was made, but afterward Public Health authorities decided it to be clinically Rocky Mountain spotted fever. Although there was no definite history of tick bite, it is probable that the tick had remained late in the season and been brought into the home by rabbits which had been trapped.

Comment

The clinical course of these cases was quite similar and conformed to that of the cases studied by Rumreich, Dyer and Badger. The rather acute onset with weakness, generalized muscular pains and tenderness, mild abdominal pain and conjunctival injection occurred in all. The rash was fairly extensive and consisted of rose-colored macules or maculopapules and petechiae; it was present prominently on the palms and soles, a rather distinctive feature. The alternating delirium and stupor are characteristic. The fever lasts from two to four weeks, declining by lysis. The history of exposure to ticks is always suggestive. The Weil-Felix reaction becomes positive usually in the second week. A mild leukocytosis usually occurs. The mortality of the eastern type is from 25 to 50 per cent. The disease closely resembles typhus fever, but the history of tick bite usually settles the question clinically. One must always bear in mind that this disease occurs in the vicinity of Washington.

N.B. The bibliography concerning this disease will be given in an article shortly to be published in the Annals under the authorship of Doctor Rumreich.

PROGRESSIVE FACIAL HEMIATROPHY*

Report of a Case

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Progressive facial hemiatrophy is such a relatively rare disease and the reported cases are so variable in their details that descriptions of additional cases may be of some value in the final analysis of the disease. Archambault and Fromm have recently reviewed the subject so thoroughly while reporting three cases observed by them that we shall give a brief summary of their study.

The disease was originally described by Romberg in 1846. Since that time about 400 cases have been described in the literature. The condition is characterized by progressive atrophy of all the structures of half of the face, including the skin, subcutaneous fat and connective tissue, muscle and bone. The two halves may be so different as to appear to be those of different individuals. Males and females are affected with equal frequency and either side of the face may be involved. The condition appears most frequently from the 10th to 20th years of age with the next greatest incidence in the first decade, but the atrophy may occur at any age. Two of the reported cases have been found in individuals of 64 and 74 years of age.

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The atrophic changes may start in any part of the face, or more rarely in the neck, and slowly spread until the entire half of the face is affected. On the contrary the process may stop at any period of its progress and only a small part of the face be changed. Frequently the atrophy is confined to the area of distribution of one or two branches of the trigeminal nerve.

The effect of the atrophy on the hair varies in the different cases, that of the eyebrow, eyelashes and beard is bleached or falls out in the majority of cases; the hair on the head is less frequently affected. The secretory functions (sweat and salivary glands) are variously affected. In some cases there is increased, in others, decreased secretion, but in the majority of cases there is no change. The surface temperature of the diseased side is occasionally lowered. Change in vascularity is difficult to demonstrate but the blanching of the affected side may indicate a diminution of lumen of the vascular bed.

Neuralgic pains occur with great frequency, sometimes preceding the onset of the atrophy by months or several years. These also may occur concomitantly with the atrophy.

The etiological factors are difficult to determine. Because of the insidiousness of onset of the condition it may have been in progress for months or a year or more before it was recognized. The influence of heredity is probably negligible. There have been a few cases in which hereditary factors seemed to play a part but these instances have been exceptional. It is true that congenital anomalies frequently occur in patients who later develop facial hemiatrophy.

Many of these patients give a history of previous infectious diseases, such as scarlet fever, diphtheria, chorea, etc., but since the condition occurs so frequently in the first two decades in which these infectious diseases predominate the relationship is difficult to evaluate. Of infectious diseases tuberculosis is probably the most important by reason of the apical pleuritis and cervical adenopathies which may effect the cervical sympathetic fibers. Tuberculosis has been found in the only cases which have come to necropsy. Local infectious processes such as acute tonsillitis, osteomyelitis and infected teeth must be considered among the possible etiological factors. Six cases developed shortly after the extraction of teeth. In from 24 to 34 per cent of cases there was a history of trauma to the affected parts; in the majority of cases it had occurred within two or three months.

The condition frequently occurs in association with scleroderma, chorea, epilepsy, migraine, facial paralysis and syringomyelia, but there is probably no etiologic relationship.

Only three cases of the true idiopathic type of progressive facial hemiatrophy have been studied at autopsy. In two of these there was found a proliferative interstitial neuritis involving the branches of the trigeminal nerve. In one of these there was atrophy of the corresponding substantia ferruginea and the descending spinal root of the fifth nerve, and the grey matter at the level of the fifth cervical cord segment was somewhat degenerated. In the other no changes were found central to the Gasserian ganglion. In the third case there were no demonstrable changes in the nerve. In all three cases there was advanced pulmonary tuberculosis.

Many theories have been advanced to account for the changes occurring in this disease, none of which explain all the signs except the sympathetic theory. Other theories are the sclerodermal, trigeminal and endocrine. The sclerodermal theory was first described by Bitot and Lande in 1870. Scleroderma frequently occurs in association with hemiatrophy but is probably merely a concomitant rather than an etiologic factor. Scleroderma usually occurs later in life than hemiatrophy and is usually symmetrical, instances of unilateral scleroderma being very rare. There are undoubtedly cases in which facial hemiatrophy followed scleroderma, but these are exceptional rather than the rule.

The trigeminal theory receives its strongest support from the pathological changes in the nerve previously noted, and also from the fact that it so frequently occurs in the area of distribution of the nerve. Against these facts, however, is the observation that hemiatrophy never follows operations on the nerve or its ganglion and that the atrophy frequently starts in the neck below the mandible.

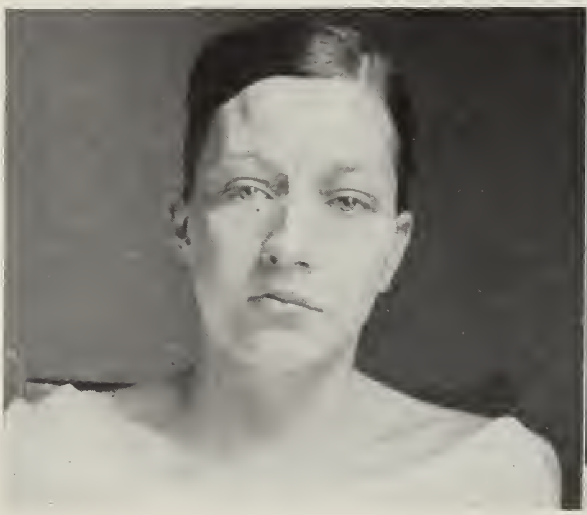

Fig. 1

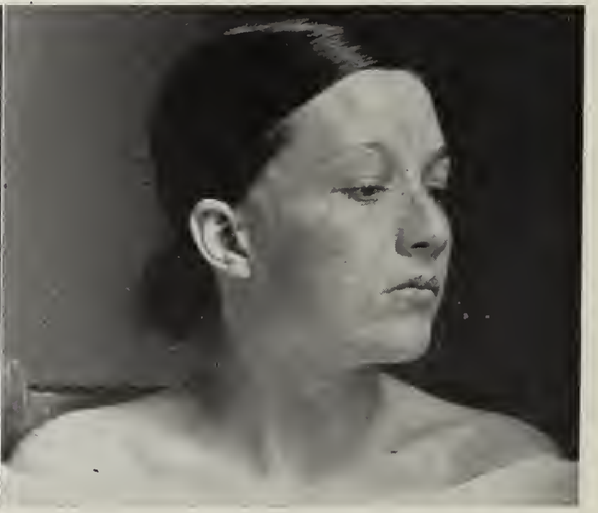

Fig. 2

Fig. 1. Front View of Patient, Showing Moderately Severe, Generalized Facial Hemiatrophy

Note the groove in the forehead, the small right ear, the deviation of the nose and the lip, the difference in the eyebrows and the pigmentation of the right side of the face and neck.

Fig. 2. Right Lateral View of the Face

Note the distribution and extent of the pigmentation

The sympathetic theory was originally proposed in 1875 by Seeligmüller and is supported by known facts of anatomy and pathology as well as of clinical observation. Archambault and Fromm strongly support this theory and point out the following facts in its favor:

1. Lesions compressing or otherwise injuring the cervical sympathetic cord repeatedly have determined progressive facial hemiatrophy on the corresponding side.

2. In the group of socalled symptomatic hemiatrophies (syringomyelia, hematomyelia, brachial plexus injuries, etc.) a concomitant Horner's syndrome (myosis, ptosis, anhydrosis and enophthalmos) was present in the majority of cases, and not infrequently there were vasomotor and secretory disturbances as well.

3. Pulmonary tuberculosis is frequently mentioned and has been found in all three cases which have come to necropsy.

4. The distribution of the post-ganglionic fibers of the cervical sympathetic ganglia is so extensive as to embrace the territory affected not only in the usual type of facial hemiatrophy but also in those cases in which the atrophy extends to the base of the neck, the upper part of the thorax and the upper extremity.

5. The extensive investigations of L. R. Müller and his pupils on the origin and distribution of the trophic fibers for the various peripheral tissues fully substantiate the claims of those who uphold the sympathetic theory.

REPORT OF CASE

The patient, a white girl, aged 17 years, presented herself for examination April 7, 1932, complaining of the following changes in her face: (a) the right ear had become smaller, (b) two depressions had appeared in the right side of the forehead, (c) the right side of the nose had become smaller, (d) the right side of the face had become yellowish-brown, (e) the right side of the lip had become smaller and was drawn upward, (f) the right side of the neck had taken on a brownish discoloration. The mother thought these changes began three years before. About ten months before, the patient noticed yellowish-brown spots on the right side of her neck. These gradually increased in size. Several weeks later she noticed a yellowish hue to the skin on the right side of her face, most marked on the ala of the nose and in the temporal region. The skin became shiny as if stretched. After several more weeks the depressions on the right side of the forehead were noted. These were at first small but gradually increased in size until they extended from the eyebrow to above the hair line. A depression in the right maxillary region appeared several weeks later and drew the lip to the right side. After this the patient observed for the first time that her right ear was smaller than the left. There had never been any trauma of the face. Chicken-pox, whooping cough and measles had occurred earlier in childhood. Menstruation had begun at the age of 14 years, and was always painful. The intermenstrual period was always longer than normal by three to seven days. Occasionally a period would be skipped. The flow lasted five days and was profuse. Headaches occurred occasionally with the menstrual periods. The vision in the right eye was blurred. The patient had attended grammar school only. Her memory was not particularly good.

Examination revealed at sight a definite hemiatrophy of the face and neck on the right side, apparently involving the entire half of the face and neck (Fig. 1). The difference included the skin, subcutaneous tissue and possibly even the bony framework. The right ear was considerably smaller than the left. The right ear measured 5.8 cm. from above down, the left 6.5 cm. The pupils were equal and reacted normally to light and accommodation. There was nystagmus when looking to either side, but much more marked when looking to the right. The vessels of the conjunctiva on the right side were markedly congested, particularly laterally and inferiorly to the pupil. Ocular movements were normal. The palpebral fissures were equal. The visual fields were roughly normal. The ocular fundi were normal. The nose was drawn definitely to the right, especially the tip. The right naris was smaller than the left. The right side of the upper lip was much smaller than the left. The right side of the tongue was somewhat smaller than the left, but did not deviate when extended. The skin on the right side of the face and neck was irregularly but extensively mottled with a brownish pigmentation (Fig. 2), and there were small brown areas on the left side also. The skin on the right side was more shiny than on the left and definitely atrophic but perfectly smooth and freely movable. The lines of expression seemed to be ironed out on the right side. This side of the face contained therefore fewer wrinkles, and the patient appeared more youthful when viewed from the right side. There was no gross difference in moisture or temperature of the two sides. The right eyebrow had fewer and shorter hairs, but there was apparently no difference in the hair of the scalp on the two sides, either in amount or texture. There was a longitudinal depression in the frontal region running up from the right eyebrow. Very little, if any, difference in strength of muscles on the two sides could be detected. The right sternocleidomastoid muscle was not as well developed as the left. There was no difference in sensations on the two sides. The teeth were somewhat yellowish and had a transverse groove about half way between the gum and their apex. There was moderate caries. No other asymmetry of the body was noted. The hands and feet were cold. The heart and lungs were normal. The abdomen was normal. The introitus was normal. The cervix could not be found with the finger or speculum, and the uterus was apparently small. The reflexes were equal and active; all were exaggerated moderately. The blood pressure was 120/76 in the right arm, 110/75 in the left. The pulse rate was 90. Urinalysis and hemogram were normal. Blood Wassermann and Kahn tests were negative. Roentgenograms of the skull showed questionable differences in the sides of the face. After injection of 1/30 grain pilocarpine hypodermically there was no sweating of the face. At a later examination when the patient was warm it was noted that perspiration was apparently equal on the two sides of the face. A photograph taken two years before showed that the changes in the face had begun before that time.

COMMENT

The essential features of this case of progressive facial hemiatrophy are involvement of the soft tissues of the entire right side of the face and neck. The picture is not that of simple scleroderma. The cranial nerves are not involved. Horner's syndrome is not present. The changes are entirely of a trophic nature, and their distribution leads one to the conclusion that they are due to central involvement of the sympathetic nervous system. An etiological factor is not apparent.

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Science Series. No. 8

RECENT DEVELOPMENTS IN PHYSIOLOGY OF THE UPPER URINARY TRACT

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Valuable contributions have been made to our knowledge of the physiology of the upper urinary tract in the last few years. Excretion urography has contributed in both the concept of excretion and of motility. Pyeloscopy (fluoroscopic observation of the mechanism of motility of the upper urinary tract by retrograde injection of various iodine compounds) has contributed in the field of motility.

The nerve supply to the kidney comes from the splanchnics and the vagus and enters it through the hilus along with and also independently of the vessels of the vascular pedicle. The function of the vagal portion is still indefinitely known and controversial. The splanchnic radicals are supposed to control excretion by the vasomotor mechanism. This function is demonstrated most strikingly in reflex anuria cases which are relieved by interference with the splanchnics, either by the injection of a local anesthetic solution or by surgical interruption of the splanchnic pathways to the kidneys. The splanchnic radicals also help control the mechanism of the motility of the upper urinary tract. This neuromuscular, tubular, urine conducting system may function regularly and coördinately even when it is completely severed from the central nervous system. The fact that the renal pelvis and ureter are very dynamic has been passed over lightly or completely forgotten by most physicians.

von Lichtenberg's studies in excretion urography have been most comprehensive and detailed. He has reported experimental work on seven different iodine compounds, of which Iopax, Skiodan and Neoiopax happen to be most familiar on account of their present commercial distribution. He has investigated toxicity, percentage of iodine, molecular weight, solubility, optimum amount to inject, the diuresis in definite time periods, the time of maximum concentration in the urine, the specific gravity of the urine and also the question whether the glomeruli or the tubules excrete the particular compound. He has observed to what extent they make the renal parenchyma radio-opaque.

By observing the time of greatest density of the roentgen shadow, he estimates the degree of renal function. This estimation, however, is open to possible error depending upon the compound used. For instance, a patient with marked tubular damage may have a very rapidly appearing dense shadow if the preparations of the uroselectan group are used and the glomeruli are not greatly damaged, because uroselectan is excreted mostly by the glomeruli. By this method to estimate the renal function by the density and time of appearance would be very inaccurate and misleading. Any type of obstruction also increases the intensity of shadows and should be taken into consideration when reading intravenous urograms, as indicators of renal function.

The ability to obtain urograms uninfluenced by the pressure of injection and the pressure exerted by the catheter as a foreign body has thrown a new light on motility and dynamic function. The ureteral mechanism is becoming much better understood. In America most of the intravenous urograms have been done and interpreted mostly from the objective anatomical viewpoint and not from the excretory function viewpoint.

Uroselectan, now known as Iopax, is being less used. Skiodan and Neoiopax are widely used and the small quantity of Neoiopax necessary to inject (20 cc.) makes this preparation especially attractive. Another new compound which is being used experimentally now under the name RP31L will probably be marketed under the name of Neoskiodan. It is given in 20 cc. dosage. In my hands this is as satisfactory as Neoiopax and does not seem to be irritating to the vein. With the amount of work that is being done on these intravenous compounds, it does not seem unreasonable to look forward to the time when some substance can be excreted in such radio-opaque intensity that intravenous pyeloscopy will be possible.

Work is now being done to determine whether radio-opacity is dependent upon the amount of iodine in the molecule. von Lichtenberg seems to question this generally accepted idea.

Kelly and Burnam have a drawing by Max Brodel in their textbook which gives a key to the sphincter-like activity of the circular musculature of the renal pelvis and ureter. This activity is so dynamic that hematuria has been supposed to result from the excessively powerful milking action of this muscle on the renal papillae as they project into the calices.

Pyeloscopy, which was first done by Manges in 1912 in order to insure satisfactory filling of the pelvis and ureter before taking pyeloureterograms, has been popularized mainly through the efforts of Legueu and his co-workers.

The normal mechanism as shown by Herbst is a very orderly, well coördinated one, which under the fluoroscope is seen to take place as follows: (1) Successive wave-like contractions of the calices beginning with the uppermost by which a portion of the content of each calix is propelled into the funnel portion of the pelvis, which distends to receive the charge; (2) relaxation of the ureteropelvic region with the formation of a gradually enlarging cone which then forces a small portion of its contents down the ureter in the form of a very thin spindle; (3) after this streak has filled about a third of the ureter, contraction of the ureteropelvic area and the passage downward of the ureteral spindle along the ureter and into the bladder, so that normally only about a third of the ureter is filled with urine at any one time; (4) relaxation meanwhile of the calices and pelvis (diastole), the time necessary for the whole cycle being usually from three to ten seconds, and the duration of diastole from two to three or more times that of systole.*

It is obvious, after having observed such mechanism by pyeloscopy, that the usual pyeoloureterogram consists of a composite picture of multiple, superimposed phases of motility. No foundation for intelligent interpretation of the usual pyeoloureterogram is quite as helpful as the experience gained by a number of carefully performed pyeloscopies.

Jona and Flecker made a very valuable contribution in their observation of the pharmacological action of atropine, morphine, eserine, strychnine, pituitrin and ergot by pyeloscopy following the injection of these drugs. They found that atropine relaxed the pelvis to such an extent that pain resulted from overdistention, and that this pain in turn could be relieved by the injection of eserine. Eserine, morphine, strychnine, pituitrin and ergot all stimulated the contractions of the renal pelvis and ureter.

Harris and Harris reported twenty-eight cases recognized by pyeloscopy in which abnormal mechanisms which they called "renal sympatheticotonus" were relieved by renal sympathectomy. I have reported another abnormal mechanism "hyperdynamic motility" relieved by renal sympathectomy. I have also recognized a number of cases of renal sympatheticotonus, all of which were so satisfactorily relieved by eserine that they did not require surgical measures.

The practical value of these contributions lies in the ability to accurately recognize abnormal mechanisms of the upper urinary tract which may be productive of pain and to institute the proper measures for relief, instead of making such diagnoses as sclerotic nephritis, nephralgia, renalgia or indeterminate renal pain.

Pyeloscopy is also very valuable in accurately differentiating the various types of obstructive morbid anatomy. The effect of changes in posture on mobile kidneys can be visualized most satisfactorily by this method. The value of this method of examination in nephroptosis is a chapter in itself. The application of pyeloscopy in checking up the results of surgery on the upper urinary tract is also important and has given us information obtainable in no other way. As an aid in determining the proper surgical procedure to be pursued in hydronephrosis, it is without an equal, for by this means one can determine whether the dilated pelvis is due to atony, neurogenically developed or whether it is due to some type of obstruction of the pelvic region or lower urinary tract.

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* A diagrammatic representation of this mechanism can be found in the Journal of Urology (Herbst).

These recent contributions to the physiology of the upper urinary tract are of great practical value and open the way to far greater satisfaction in the handling of many complaints due to malfunction of the pelvis and ureter.

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ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"Galactose Tolerance as a Measure of Liver Function,"* **Joseph H. Roe, Ph.D.**

Galactose tolerance as a measure of liver function is being studied by determining the galactose content of the blood and urine following the ingestion of 1 gram of galactose per kilogram of body weight. Preliminary studies seem to indicate that galactose utilization cannot be taken as a measure of liver function in chronic liver disease; that positive results may be obtained in acute cases; and that this test may be of value in differentiating an obstructive jaundice of infectious origin, such as a catarrhal cholangitis, from obstructive jaundice arising from non-infectious causes.

Discussion: Dr. C. R. L. Halley.

"The History of Laryngology and Rhinology and the Influence of America in the Development of this Specialty,"† by **Joseph Hammond Bryan, M.D.**

The following events are the highlights in the history of this specialty:

1837—Philip Syng Physick, surgeon, of Philadelphia, invented the tonsillotome, modifications of which are in use today.

1846—Horace Green of New York published his records of cases of diseases of the larynx, bronchi and trachea. He removed a laryngeal polyp in a child 11 years of age. He was called "The Father of Laryngology" in this country.

1848—Gurdon Buck, surgeon, of New York, described his method of treating edema of the larynx. He removed several large tumors, operating by sense of touch. He later improved the operation of tracheotomy.

1857—Manuel Garcia, celebrated teacher of singing in London, inventor of the laryngoscope, read a paper on his discovery of the vocal cords before the Royal College of Surgeons.

1857—Prof. Turck, of Vienna, and Czermak, of Budapest, used the laryngoscope in the wards of the Allgemeine Krankenhaus, Vienna, both claiming priority in the use of the laryngoscope. The Academy of Sciences, Imperial Institute of France, gave each an award, without decision of priority.

1857—Morrell Mackenzie read a paper before the Royal College of Surgeons on "Pathology and Treatment of Laryngeal Diseases," for which he was given the Jacksonian prize.

1857—Wilhelm Myer, of Copenhagen, read a paper in London on "Adenoid Vegetations in the Naso-Pharynx," advancing surgical rhinoscopy. The same year Voltoline and Semeleder first practiced posterior rhinoscopy as an aid to passage of the eustachian catheter.

1861—Lewin, a German surgeon, reported the first recorded case of laryngeal tumor removed by the aid of the laryngoscope.

1866—Cheeseman, an American, wrote an elaborate article on "Papilloma of the Larynx." J. Solis Cohen, pioneer teacher, shortly afterward reported a case of removal of a laryngeal polyp by endolaryngeal method. He wrote the first extensive textbook on this specialty.

1879—The American Laryngological Association was founded under the presidency of Dr. Louis Elsburg. Elsburg founded the first journal devoted to this specialty.

1881—Bosworth devised the nasal saw and other instruments. He wrote the first extensive work on rhinology.

1885—Joseph O. Dwyer, an American, revolutionized the treatment of diphtheria and stenosis of the larynx by introducing intubation. His publication and discovery of tolerance of the larynx to a foreign body led to direct laryngoscopy.

1887—The tragedy of the Crown Prince of Germany, with Gerhardht, von Bergmann, Virchow, Morrell Mackenzie, Shroetter, Krause, Mark Hovell and Moritz Schmidt in attendance, showed the difficulty of diagnos-

(*Continued on page 246*)

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* Presented March 30, 1932.

† Presented April 27, 1932.

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ESSENTIAL HYPERTENSION

Of great importance to all is the problem of essential hypertension. It ranks with cancer as a slayer of mankind. Most cases of high blood pressure are instances of essential hypertension. Hypertension secondary to renal disease is much less common. One hears it said frequently that high blood pressure is not a disease but only a symptom. This is literally true, but practically it is the hypertension itself which is the disease, although in late stages secondary organic vascular changes are of great consequence. The term 'essential' is applied because of the unknown nature of the cause and not of the nature of the disease itself. Many theories have been advanced to explain essential hypertension. Gager[1] has discussed these theories in his recent monograph on this subject. The most plausible are those which postulate either excessive stimulation of the vasomotor center by psychic impulses or imbalance of autonomic reflex mechanisms. Some recently reported studies of essential hypertension are interesting, although they do not bring us any nearer the root of the trouble. Murphy, Grill, Pessin and Moxon[2] give the results of a clinical and morphological study of 375 cases. These included only patients with a persistent systolic blood pressure of 160 mm. of mercury or above and a diastolic pressure over 100 mm. of mercury. All of the 375 patients came to necropsy. Congestive heart failure or coronary thrombosis were given as the cause of death in 50 per cent, renal insufficiency in 10.4 per cent, a cerebral catastrophe in 13.4 per cent, intercurrent infections in 14.2 per cent and miscellaneous conditions in 12 per cent. This distribution corresponds fairly well with the previous report of Bell and Clawson[3] on 420 cases, although the latter attributed death more often to heart failure (60.4 per cent) and apoplexy (19 per cent) and less to uremia (8.6 per cent). Herxheimer and Schulz[4] reported more instances of apoplexy, with 44 per cent of 403 cases, but this was probably not the primary cause of death in all of these cases. Most of the patients in these large groups were between 40 and 80 years of age, although no age is immune. Hypertension is probably more common in women than in men, but often less severe. Blackford and Wilkinson[5] report a study of 202 cases followed for an average of 10 years. There were twice as many women as men, but the mortality rate after 10 years was twice as great in the men.

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[1] Gager, L. T.: Hypertension, Baltimore, Williams & Wilkins Co., 1931.

[2] Murphy, F. D., Grill, J., Pessin, B., and Moxon, G. F.: Essential (Primary) Hypertension: A Clinical and Morphological Study of 375 Cases, Ann. Int. Med., 1932, **6**, 31.

[3] Bell, E. T., and Clawson, G. J.: Primary (Essential) Hypertension; A Study of 420 Cases, Arch. Path., 1928, **5**, 939.

[4] Herxheimer, G., and Schulz, K.: Statistisches zum Kapitel Bluthochdruck, Herzhypertrophie, etc., Klin. Wchnschr., 1931, **10**, 433.

[5] Blackford, J. M., and Wilkinson, J. N.: Hypertension. A Study of 202 Cases Followed for an Average of Ten Years, Ann. Int. Med., 1932, **6**, 54.

Hypertension is far more serious in persons under 40 years of age. Murphy et al.[2] divide their cases for convenience of study into three stages: functional, arteriosclerotic and arteriolonecrotic. Hypertension without clinical evidences of arteriosclerosis, other than those seen in normal people, was the chief feature in the first group. There were no symptoms or signs ordinarily present in cardiovascular-renal disease. Frequently there were no symptoms, and the patients died of causes not related to the hypertension. Group 2 represented a stage of slow progression, and the symptoms were those produced by sclerotic narrowing of the lumina of small arteries and arterioles leading to ischemia and slow fibrosis of internal organs. In this stage heart failure, cerebral accident and renal failure may appear. Group 3 was the smallest group and included rapidly fatal cases. These are often called "malignant hypertension." The chief features are persistent excessive hypertension, violent headaches, sudden loss of weight and strength, typical retinal changes, and a rapidly downward course with functional breakdown of one or more essential organs. In this type of case an arteriolar necrosis is superimposed on the arteriolosclerosis.

Cardiac hypertrophy, especially of the left ventricle, is an almost constant result of hypertension. Wiggers[6] regards this as a compensatory and beneficial factor. It is a "normal functional response to increased stretch, regardless of whether this is secondary to physiological or pathological changes in the circulation." Hypertrophy of the heart in hypertension should not, therefore, be looked upon as heart disease. In hypertension the actual minute volume output of the heart is not increased but the diastolic size and initial tension in the ventricles are increased, so that systolic arterial pressure is elevated and the normal capillary volume flow thereby maintained. The reserve capacity of the heart is gradually used up after years of strain, when the heart becomes exhausted and symptoms and signs of congestive failure ensue. Coronary arteriosclerosis of abnormal degree develops in about 50 per cent of cases, and coronary thrombosis may occur before congestive failure sets in. Curiously enough there is rarely ever any *arteriolosclerosis* in the myocardium, so that heart failure never ensues from this cause, which is the main reason for the renal insufficiency which occurs in 10 to 20 per cent of cases.

The widespread *arteriolosclerosis* which occurs in hypertension has been well demonstrated by Kernohan, Anderson and Keith,[7] who showed that even the arterioles of the skin and voluntary muscles have thickened walls and diminished size of their lumen. More recently Horine, Weiss and Beard[8] have confirmed this finding in biopsy specimens of deltoid muscle of patients who had enlarged hearts but normal blood pressures. They showed that by this method hypertension could be diagnosed even when the blood pressure had returned to normal, as sometimes happens when the heart begins to fail. This procedure together with the ophthalmoscopic finding of retinal arteriolosclerosis[9] constitutes in such cases the only methods of making an exact diagnosis.

All means of lowering blood pressure by drugs are practically valueless. "Treatment of uncomplicated hypertension is a matter of physical hygiene rather than of drugs. Treatment of late results of hypertension requires skillful use of medical and physical measures, added to psychotherapeutic measures. The physician who is a good and cheerful psychologist will be the most successful in relieving the symptoms of hypertensive cardiovascular disease."[5]

Since we are still unaware of the exact cause of hypertension, physicians who study this subject carefully from day to day in their patients may be the ones who will eventually clarify the subject. Such a discovery will be as great a boon to mankind and as great a victory to the medical profession as the discovery of the cause of cancer.

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[6] Wiggers, C. J.: Physical and Physiological Aspects of Arteriosclerosis and Hypertension, Ann. Int. Med., 1932, **6**, 12.

[7] Kernohan, J. W., Anderson, E. W., and Keith, N. M.: Arterioles in Cases of Hypertension, Arch. Int. Med., 1929, **44**, 395.

[8] Horine, E. F., Weiss, M. M., and Beard, M. F.: Arteriolar Studies in Patients with Hypertensive Heart Disease Without Hypertension, Am. J. M. Sc., 1932, **184**, 206.

[9] Yater, W. M., and Wagener, H. P.: Ophthalmoscopic Signs in Disease of the Heart, Am. J. M. Sc., 1929, **178**, 105.

PROGRAM, SOCIETY ACTIVITIES

OCTOBER

With the coming of October the regular Wednesday evening meetings begin. Conspicuous on the program is the Medical Society's participation in the George Washington Bicentennial Celebration. To this meeting on October 12, in addition to officialdom, will be invited our lay friends, in particular, patriotic societies with special interest in the life and time of our first President. The symposium offers an angle to the celebration not obtainable otherwise.

October 5: Business Meeting.

October 12: George Washington Bicentennial Celebration.

1. Dr. Wyndham B. Blanton, Richmond, Va.: "Medical Knowledge of Washington, and Its Sources."
2. Dr. John B. Nichols: "Medical Appraisal of George Washington."
3. Dr. Walter A. Wells: "The Final Illness of George Washington."

October 19: Papers by Drs. William P. Herbst and Earl B. McKinley.

October 26: Program to be given by the Section on Pathology and Laboratory Medicine, Garfield Hospital Group.

ACTIVITIES OF SECTIONS

OCTOBER

Section on Neoplastic Diseases, Eugene R. Whitmore, Chairman, meets Saturday afternoon, October 15, 1932, at Georgetown University Hospital.

Section on Ophthalmology and Oto-Laryngology, Albert P. Tibbets, Chairman, meets Friday, October 21, 1932. Charles L. Billard, John W. Burke, Victor R. Alfaro and Richard A. Kearny will participate in the program.

LIP READING INSTRUCTION

The class of instruction in the art of lip reading, inaugurated by the Episcopal Eye, Ear and Throat Hospital, and sponsored by the Washington League for the Hard of Hearing, will begin its fall term on Tuesday, October 4, 1932, at 7:45 P. M. in the dispensary of the hospital, 1147 Fifteenth Street, Northwest. There will be a separate class for the colored. The instruction is free, and is extended to the worthy indigent deafened of the District of Columbia and its environs.

REPRINTS RECEIVED

The following reprints have recently been received for which due acknowledgement is made:

"Seasonal Hay Fever, With Special Reference to the Middle Atlantic States," Journal of the Medical Society of New Jersey, 1932, by Grafton Tyler Brown, B.S., M.D., F.A.C.P.

"A New Early Diagnostic Sign of Acute Appendicitis," Medical Annals of the District of Columbia, June, 1932, by James A. Cahill, Jr., M.D.

RECENT CHANGES OF ADDRESS

Recent changes in office address of active members or applicants for membership in the Society. The addresses noted below represent present location.

1726 Eye Street, N.W.	**Office Hours**
Roy D. Adams	11 A.M. to 1 P.M. By Appointment.
Norvell Belt	9 to 11 A.M.; 3 to 6 P.M.
Jerome F. Crowley	3 to 5 P.M.
Edmund M. Ellerson	2 to 4 P.M. (Mon., Wed., Fri.)
Joseph F. Elward	8:30 A.M. to 1 P.M.; 2 to 6 P.M.
Russell J. Fields	9 A.M. to 12 M.; 3 to 6 P.M.
Leslie H. French	9 A.M. to 12 M.
Herman Hertzberg	1 to 4 P.M.
Mary Holmes	8:30 to 10 A.M.; 4 to 6 P.M.
R. Arthur Hooe	9 A.M. to 12 M.; 4:30 to 6 P.M. (Sat. and Wed. 9 A.M. to 12 M.)
Janvier W. Lindsay	By Appointment
E. Clarence Rice	11 A.M. to 1 P.M.; 4 to 6 P.M.
Maurice A. Selinger	9 to 10:30 A.M.; 4 to 6 P.M.
Prentiss Willson	1 to 3 P.M. (Mon., Wed., Fri.) Wed. By Appointment.

1801 Eye Street, N. W.

Richard E. Dunkley	9 A.M. to 12 M.; 4 to 6 P.M. (Mon., Wed., Fri.) 9 A.M. to 12 M. (Tues., Thurs., Sat.)
John G. Lynn	12 M. to 2 P.M.; 5 to 6 P.M., except Wed. and Fri.
Bernard Notes	3 to 6 P.M. By Appointment.
Charles A. Schutz	1 to 3 P.M. (Tues., Thurs., Sat.)
C. W. Tegge	9:30 A.M. to 12 M.; 3 to 5 P.M.
Lyman B. Tibbets	9 A.M. to 12 M.; 3:30 to 5:30 P.M.
Tom A. Williams	5 to 6 P.M.
John D. Wynkoop	1 to 2 P.M.; 4 to 6 P.M., except Saturday 5 to 6 P.M.

1835 Eye Street, N. W.

Robert M. Bolton	9 A.M. to 12 M.; 3:30 to 5:30 P.M.
B. L. Hardin, Jr.	4 to 6 P.M.
Paul J. O'Donnell	By Appointment.
H. P. Parker	2 to 5:30 P.M. (Tues. and Thurs.)
Herbert P. Ramsey	3 to 5 P.M. (Mon., Wed., Fri.)
I. Lewis Sandler	10 A.M. to 12 M.; 4 to 6 P.M. Saturday by appointment.

1915 Biltmore Street, N. W.

James A. Gannon	3 to 6 P.M. Mornings by appointment only.

1371 Monroe Street, N. W.

Wm. E. Whitson	9 A.M. to 12 M.; 4 to 6 P.M.

ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

(*Continued from page 242*)

ing a benign from a malignant growth, before submitting a specimen for biopsy to Virchow. A slide of true pachydermia laryngis was shown.

1888—Roux and Yersin investigated the diphtheria bacillus and antitoxin, which was developed by Behring, E. Frankell, Roux and Martin.

Discussion: Drs. A. C. Christie and Walter Freeman.

THE PAN AMERICAN MEDICAL ASSOCIATION

MEETS IN DALLAS, MARCH, 1933

The first international session, or congress, of the Pan American Medical Association, organized to promote intimate relationships among members of the profession throughout the Americas, and to afford physicians of the various republics an opportunity to meet together to discuss medical and other problems of mutual interest, was held in Havana, Cuba, in 1929, and was an immediate success; the second meeting taking place in Panama in 1930, and the third in Mexico City in 1931. The fourth meeting is scheduled to take place in Dallas, Texas, March 21–26, 1933.

Perhaps it should be explained that the permanent organization of this body is known as the Pan American Medical Association and the annual meetings are referred to as the Pan American Medical Congresses. Dr. Francisco María Fernández, Havana, Cuba, is President of the Association; Dr. John O. McReynolds, of Dallas, Texas, succeeded to the presidency of the Fourth Congress upon the death of Dr. Arístides Agramonte, late of the Medical Department of the University of Louisiana, a man who won undying fame for his work in association with Reed, Carroll and Lazear in the study of the transmission of yellow fever.

A local chapter of the Pan American Medical Association was organized at the Mexican Embassy in this city, April 5, 1932, at which time Dr. Hugh S. Cumming, Surgeon General of the United States Public Health Service and Director of the Pan American Sanitary Bureau, was elected President. At a meeting at the Cosmos Club on September 13, Dr. John O. McReynolds, who will preside over the Fourth Congress, outlined the plans and objectives of the approaching Congress.

THE PROGRAM, DALLAS MEETING

March 21, 1933: Formal inaugural exercises. Addresses by distinguished guests.

March 22: Clinics in all hospitals of the city under the direction of members of the local profession, followed by a round table luncheon conducted by visiting physicians. At the afternoon and evening sessions there will be addresses by distinguished guests. The evening meeting is a general meeting to which the public is invited.

March 23: Meeting of the House of Delegates; 9 a.m. to 12 M. and 2 to 5 p.m. scientific sections meet. A program arranged by a joint committee of English-speaking and Spanish-speaking participants will be presented before the twelve sections. At 8 p.m., addresses on scientific subjects by outstanding authorities of the Western Hemisphere.

March 24: Second meeting of the House of Delegates. Instruction courses will be given by eminent visiting physicians. Round table luncheon. 2 to 5 p.m., a general session, at which time will be presented addresses on scientific subjects by various world authorities. 8 p.m.—Formal reception and ball.

March 25: Morning clinics. Barbecue at noon, with horse races, horse show and polo games in the afternoon. The night meeting will be under the auspices of the medical profession of Fort Worth.

March 26: Services in various churches and an afternoon gold meet and automobile excursions throughout the city.

Visiting ladies will be entertained by the Dallas Women's Club on the afternoons of March 21, 22 and 23.

Dr. McReynolds expressed himself as greatly pleased with his reception by the local chapter and it is hoped that Washington may be well represented at the Dallas meeting. Those present at the Cosmos Club were: Hugh S. Cumming, J. B. Keen, Bolivar J. Lloyd, Luis M. Debayle, C. B. Conklin, C. W. Bullard, Wm. Gerry Morgan, Luis García, Victor R. Alfaro, Wallace M. Yater, F. X. McGovern and J. G. Lewis.

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THE STATUS OF SERUM THERAPY IN POLIOMYELITIS*

WILLIAM HALLOCK PARK, M.D.

Professor of Bacteriology and Hygiene of the New York University; Director of the Bureau of Laboratories and Consulting Bacteriologist of the New York Health Department.

THE EFFECTIVE TIME FOR SERUM THERAPY

The majority of paralytic cases of poliomyelitis present at the onset febrile symptoms together with signs of meningeal involvement which may be followed on the third or fourth day by paralysis. In certain bulbar cases the first complaint is of paralysis. This is true to a lesser extent of other types of cases. Then there are the abortive types. Here the signs and symptoms are those of a general infection. There are no paralytic or meningeal symptoms. After a short interval the symptoms may return and paralysis develop. It can clearly be seen that without paralysis it is difficult to make a diagnosis of infection with the virus of poliomyelitis. In fact, it is generally impossible without the aid of a report on the examination of the spinal fluid. It is now generally agreed that treatment with antiserum, if of value at all, is of value only before paralysis has developed. This is not always easy to determine, for as Aycock has pointed out in a careful analysis, there are many cases erroneously classed as treated in the pre-paralytic stage. The muscle weakness, subsequently shown to exist by precise tests, simply has not been detected in the sickness of the acute period. Such cases, if they develop after being treated by immune serum, do not necessarily declare against its efficacy, since they were not pre-paralytic cases. George Draper has pointed out that there is a stage in the disease which precedes that of beginning muscle weakness in which there is clear clinical evidence that the anterior horn cells are already intoxicated though not yet seriously injured. This is the stage of ataxic tremor and muscle twitching. It seems to be analogous to the excitement stage of the experimental disease in monkeys.

When this tremor sets in it is safe to assume that the virus has already entered into conjunction with the anterior horn cells. The physiologic effect of this is one of stimulation; but after this union has occurred it may be too late to expect successful therapeutic effects from the serum. Consequently, these cases, should they go on to paralysis, will likewise fail to support the therapeutic value of the serum. Draper brings out that the brief interval of time between the moment of choroid plexus penetration by the virus and the moment of virus-cell union is the precious period during which the serum can be expected to neutralize the invading virus and so prevent paralysis. As Draper further states, not only is this period of short duration, but it is extremely difficult to place accurately in the course of the malady.

It may be asked why the serum should not be given intraspinally at the time of the diagnostic punctures when the spinal fluid findings are still negative. Besides the objection of necessarily frequently making a wrong diagnosis at such an early stage, the objection to so doing may perhaps be only theoretical, but it appears to be important. Flexner and Amoss have shown that the choroid barrier is remarkably resistant to the passage of the virus unless the integrity of its cells has been disturbed by some slight injury. They found in monkeys even the performance of a lumbar puncture and reinjection of spinal fluid from another monkey may reduce the choroid's defense, and that the intraspinal injection of homologous serum abolishes it almost completely. Apparently the virus cannot pass from the blood to the cerebrospinal fluid and nervous tissues until there has been an injury to the choroid plexus, meningeal blood vessels and lymphatics. Indeed, the natural effectiveness of the choroid barrier may well be the important constitutional factor which protects many patients from the virus invading the spinal cord and the development of paralysis.

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* First Davidson Lecture, read before the Society, November 18, 1931.

In the human disease, therefore, it is the general opinion that lumbar puncture is essential to aid in the diagnosis of the infection and to provide evidence that the virus has penetrated into the cerebrospinal space. Consequently, as Draper says, it may be argued that if the serum is effective at all it should be injected intraspinally unhesitatingly, whether there is evidence or not of involvement of the spinal cord as shown by the spinal fluid. For even if its presence in the cerebrospinal space serves to break down the choroid barrier, it will still be there to intercept the penetrating virus. In the present state of knowledge, however, it would seem wiser according to Draper to omit the intraspinal dose when the spinal fluid shows an increase in cells and to give a large dose, 50 cc. if possible, intravenously or intramuscularly. Doubtless by this procedure certain cases which are not acute poliomyelitis will be treated. But the serum given intravenously is practically harmless. Obviously, if one believes the serum is of avail when the spinal fluid has become positive, from 15 to 20 cc. of human immune serum should be given at once intraspinally in addition to an intravenous or intramuscular dose.

Thus it would seem appropriate to Draper to combine the maneuver of repeated lumbar puncture with the most refined clinical observation. By this means one should be able to apprehend, within a very short time of its occurrence, the moment when the virus has broken through the choroid barrier and has begun to infect the meninges and spinal cord. In addition there is good reason to believe that if the antiserum was given intravenously at the time of the negative fluid observations in suspicious cases it would be effective in preventing infection through the destruction or inhibition of the virus. Draper gives several instances to illustrate the value of treating cases according to his suggestions. They are so helpful in indicating the reasons for treatment that I will repeat three of them. Recently a case was seen which had shown a negative fluid at the first two punctures. Examination of the child nine hours later showed no evidence of the spine sign; but 3 hours after this examination the spine sign was present. A puncture then showed increased pressure, 50 cells, of which 60 per cent were polymorphonuclears, and positive globulin. Furthermore, there was no ataxic tremor. It would seem, therefore, that the third puncture had been made actually within the "passage period" of the virus. This child received 15 cc. of human immune serum intraspinally and 60 cc. intramuscularly. The temperature was normal 24 hours later, and there was recovery without muscular weakness.

In another case, lumbar puncture was not done when the classic picture of an acute infection first existed in a child, aged 7. At that time the drowsy-eyed, furtive look which we consider to be indicative of poliomyelitis was clearly present. Four hours later the same picture remained and lumbar puncture was again postponed. Three hours later a very slight spine sign was noted. Lumbar puncture at that time resulted in a negative fluid. In spite of this finding the child was given 25 cc. of human immune serum subcutaneously. Eight hours later the temperature was normal and the child rapidly returned to a state of well being. This instance is mentioned with the obvious proviso that it was probably not one of acute poliomyelitis; but it is the type of case which causes great perplexity in time of epidemic. If, however, it was an instance of infection, the puncture must have been done very close before the "passage period" in a case in which, however, the virus was not destined to pass. At present there are no means of making a certain diagnosis of such a case.

A third illustration in which the position of the "passage period" was indicated by the correlation of the clinical picture and the spinal fluid observations is provided by the case of a boy, aged 7, whose parents had not called a physician until the second phase of the disease had set in. The physician made a puncture, and, because he was not equipped to examine the fluid at the bedside, took the specimen to the laboratory. There it was found to contain 150 cells and positive globulin. In an hour another lumbar puncture was made. Fifteen cc. of human serum was given intraspinally and 50 cc. intravenously. Twelve hours later weakness of the right anterior tibial group developed and later still one deltoid failed; but it is significant to note that at the time of treatment the patient exhibited marked ataxic tremor, showing that the anterior horn cells were already involved with the virus. Clearly, in this case the therapeutic puncture was done after the end of the "passage period." I have given space in this address to Draper's practical and theoretical observations so as to make plain through the words of one of the ablest advocates of serum therapy, the comparative shortness of the time in which the advocates of serum treatment believe it is advisable. Unless a skilled diagnostician and laboratory technician are available, it is practically impossible to choose the right time for the therapeutic use of the antivirus serum. Draper concludes his paper with the following words: "These considerations suggest why serum therapy apparently often fails to check paralysis even though it is administered in what is clinically the pre-paralytic stage. Not only is serum ineffective after paralysis has appeared, but it may well be too late to hope for success after the ataxic tremor has developed. However, at present there is not sufficient knowledge to justify withholding vigorous serum therapy at this stage. Serum should, of course, be given when ataxic tremor is present."

LOCAL EFFECTS OF INTRASPINAL INJECTIONS OF SERUM

The most evident action of the serum is marked cellular response of the cerebrospinal meninges in the presence of the serum injected by lumbar puncture. This cellular reaction consists of a very decided increase of the polymorphonuclear cells, which preponderate in some of the cases to the extent of 95 per cent, while the total cell count increases to from 500 to 10,000 cells per cubic centimeter. This increase of cells is at times so pronounced that the spinal fluid obtained at the end of 24 hours has a very turbid, almost purulent appearance, and a heavy sediment of cells is found in the test tube within a few hours after the lumbar puncture. Culturally, these fluids are practically always found to be sterile. This cellular response also follows the injection of normal human serum, and to an even greater degree that of normal horse serum. This high cellular response of the cerebrospinal meninges is probably due to the very marked congestion of the vessels of the piarachnoid and of the cerebral cortex. It is possible that in the use of immune serum we have, in addition, the helping factors of antibodies against the virus of poliomyelitis which stimulate the polymorphonuclear cells to increased phagocytic activity. We cannot estimate the phagocytic action of the cells, as the virus is too minute to be seen.

When the injection of immune human serum is made in the later stages of the disease, after the temperature has already subsided, the cellular response is found to be much less and only an opalescence of the spinal fluid is noticeable at the end of 24 hours. This lessened cellular response is probably due to a subsidence of the acute congestion of the brain and meninges.

General Reactions of Spinal Injections

Clinically, the injection of immune human serum is usually followed within 24 hours in the early pre-paralytic cases by an intensification of the meningeal symptoms. There is increased rigidity of the neck, opisthotonos, marked Kernig's sign, hyperirritability, headache, vomiting and increased temperature which in the most severe reactions reaches 104°F. or 105°F. Occasionally, when the reaction is especially severe, there are twitchings or even convulsive movements of the extremities. These symptoms represent merely a more severe degree of the early pre-paralytic phenomena of the disease. In some of the cases the rise of temperature was simply caught in its upward rise in the course of the disease, and had, therefore, no significance with regard to the treatment. Definite temperature reactions were, however, noted not only after primary but also after secondary injections of serum. The typical curve is a quick rise to about 104°F., persisting for another 24 hours, generally without any further increase after a second dose of serum, and subsiding by a rapid lysis.

Serum Therapy in the Epidemic of 1916

In the 1916 outbreak of poliomyelitis, although I did not have any personal experience in treating the disease, I was nevertheless in close touch with the results obtained by Dr. A. Zingher who was favorable to it and Dr. Josephine Neal who was rather opposed to it. In summing up his conclusions Dr. Zingher made the following statement: "It is known that in poliomyelitis we have a group of abortive non-paralytic cases in patients who go through the premonitory symptoms, but do not develop paralysis. It is difficult to state, therefore, how many of the patients treated with serum would have remained free from paralysis without serum treatment. Conclusions based on any form of treatment in a disease which is so variable in symptomatology and in prognosis, both as to life and disability, must be given with reserve. It seems to me, however, that the action of serum in poliomyelitis is beneficial, that human serum is indicated in the treatment of the acute stages, especially in the pre-paralytic period of the disease. When carefully observed and controlled, the treatment is harmless. A distinct reaction follows in some of the cases after the first dose; the reaction is less marked after the second, and little, if any reaction is noted after the third injection of serum." Dr. Neal, who had charge of the meningitis division of the laboratories, was opposed to the serum treatment. She states: "Thus far no specific treatment for poliomyelitis has been successfully developed. In the minds of the general public and of most physicians there exists a close analogy between the use of serum in epidemic meningitis and in poliomyelitis. The success of this treatment in the former disease has given rise to hopes for the success of the same method in poliomyelitis. The pathology of the two conditions is, however, quite different. In acute purulent meningitis the process is limited almost entirely to the meninges, the brain and cord substance being little if at all involved, though there may be some secondary congestion. In poliomyelitis, however, the pathologic picture is reversed. Here, the brain and cord substance is mainly involved, whereas the inflammation in the meninges is secondary. Injection of a foreign substance into the slightly inflamed meninges sets up in most cases more or less severe acute aseptic meningitis, as is shown by changes in the spinal fluid and clinically by the increased temperature, rigidity of the neck and other signs of meningeal irritation. It is possible that this increased inflammatory reaction may tend to accentuate indirectly in some degree the inflammatory changes already existing in the subjacent substance of the brain and cord. On the other hand, certain workers do not agree with us, since they believe that a beneficial phagocytosis may result from the increased leukocytes. In meningitis the injection of serum into actively inflamed meninges is not followed by an increase in the inflammatory reaction as is evidenced by the clearing up of the fluid and the amelioration of the clinical symptoms in favorable cases."

The setting up of an acute aseptic meningitis may be harmful. As to the specific neutralizing power of the serum, this, to be effective, would have to be exerted very speedily, after the first involvement of the spinal cord. Perhaps even then it would be too late after the onset of symptoms. In monkeys it is impossible to prevent the development of the disease even when the protective serum is given two days before the onset of symptoms.

The members of the Meningitis Division of the laboratory did not administer serum in a very large number of poliomyelitis cases during the epidemic of 1916, because the early experiences were so discouraging that they did not feel that they could urge its administration. The reaction following the introduction of the serum in the cases of the patients who survived was often so severe that it was thought the inoculation might have been an injurious factor in some instances.

They felt that the best results in early cases were obtained by complete rest, with lumbar puncture for the relief of signs of meningeal irritation. Symptomatic and hygienic treatment should, of course, be carried out. The importance of rest cannot be too strongly emphasized. That form of treatment would need to be of definite and well-established value that could justify the frequent disturbance of a desperately sick child for the administration of treatment intraspinally.

Active Immunization in Monkeys

Monkeys can be immunized by repeated intracutaneous injections of living virus and to a lesser extent by subcutaneous injections. Intracutaneous injections in monkeys rarely produce poliomyelitis, while subcutaneous injections frequently do. The immunized monkeys had antibodies in their blood. We have as yet no safe and efficient method for human immunization.

The Technic of Convalescent Serum Therapy

Several months after recovery from poliomyelitis the serum contains potent antibodies and these remain, so far as a limited experience teaches, for life. In large centers of population the great majority of adult persons have antibodies in their blood and to the average amount of at least 50 per cent of that in convalescents. The opinion is that this is because of the fact that city dwellers are exposed to the virus and develop infections which have never involved the central nervous system. This is an assumption founded on probability, but without any absolute evidence. As the serum of different individuals, both those having had the clinical disease and those not, differs in its potency, it is very important to mix several serums together to obtain a therapeutic serum or blood of a fairly uniform and sufficient potency. The donor is usually placed on a bed or table in a reclining position or may prefer to sit on a chair. The arm rests on a table and extends over its edge with the flexor surface upwards. A screen prevents the patient seeing the arm while the blood is being drawn. The skin at the bend of the elbow is painted with half strength iodine. A tourniquet is then applied half way up the arm so as to impede the return of the venous blood, but not to materially affect the arterial flow. Under aspetic precautions the needle is then inserted in the largest available vein. The details of obtaining the blood can be read in the article by Aycock in the Journal of the American Medical Association of February 2, 1929. In general, 400 to 500 cc. can be taken from the average adult without causing any deleterious consequences. The average child of 12 years yields about 200 cc. Unless the blood or serum is to be used immediately a preservative is added. Until recently the intraspinal route was preferred for at least a portion of the serum. Before giving the antiserum as much spinal fluid is withdrawn as possible. Following the lumbar puncture, the withdrawal of spinal fluid and the injection of the antiserum, an injection of 30 to 60 cc. of serum is given in the vein or intramuscularly. On the following day the lumbar puncture is repeated and the serum again injected. If the patient still has fever the intravenous or intramuscular injection is repeated. When convalescent serum is not available 30 cc. of the whole blood can be removed from each of the parents and given to the child intramuscularly. Two parents are preferred so that there will be a greater certainty of using a fairly potent serum.

During the 1931 epidemic the tendency has been to give the antiserum either intramuscularly or intravenously or to combine the two methods because of the possible harmful effects of the intraspinal injections, especially in bulbar cases. The Canadians use the intramuscular method almost entirely.

THE 1931 EPIDEMIC IN NEW YORK CITY

When it was realized that there was to be an outbreak of poliomyelitis this past summer, the New York Academy of Medicine appointed a committee to have charge of the collecting of convalescent serum and its administration in pre-paralytic cases of the disease. This committee acted in full coöperation with the officials of the Department of Hospitals and the Department of Health. As Director of the Bureau of Laboratories as well as one of the members of the commmittee, I had considerable responsibility concerning the collection of serum and its administration. After several conferences it was agreed that the use of the serum was not of certain value, and therefore, that it was not necessary to urge parents to have the serum given, while of course no opposition would be made to giving it when desired. The hospital physicians were urged not to give serum to cases unless requests came to do so from the parents of the children. At the end of the epidemic we find that a total of 927 children were treated either in the hospitals or in the homes before paralysis developed. Of these 519 received serum. This serum was given purposely in many ways. In a considerable number the Aycock plan was followed with combined intraspinal and intravenous injections. Others, according to the Canadian plan, received the serum intramuscularly, while some received a combination of the two methods.

The children were carefully investigated as to the amount of paralysis and the number of deaths occurring in the treated and untreated cases according to age, day of illness and according to the apparent severity of the cases at the time they were first seen. There was practically no difference between the treated and untreated children in these different groups. The untreated cases showed somewhat better results as to lack of paralysis and a somewhat lesser fatality. This, of course, may be due to the fact that unwittingly the cases selected for treatment were on the average a little bit more severe than those untreated, and this probably is true, although there was no attempt made to have such a difference occur.

THE DEVELOPMENT OF ANTIVIRUS SUBSTANCES IN HORSES

Since the discovery by Netter and Levaditi of the presence of virus-neutralizing antibodies in the blood, both from human convalescents and from monkeys which had recovered from experimental poliomyelitis, several attempts have been made to immunize large animals with a view to quantity production of therapeutic serum.

Flexner, in 1919, reported unsuccessful attempts to bring forth an immunological response in a horse by injection over a period of many months of filtrates carrying the active virus of poliomyelitis.

In 1917, Banzhaf and Neustadter from my laboratory published results of similar efforts, having injected subcutaneously and intramuscularly the supernatant fluid from emulsions of brains and spinal cords of monkeys dying of poliomyelitis. This antiserum gave some evidence of ability to neutralize virus in the few experiments then conducted, but was very weak in antibody.

Pettit, in 1918, described the preparation and subsequent use in human cases of a horse serum drawn from an animal which had received injections over a period of 2 years. He did not test this serum directly for virus-neutralizing antibodies but depended upon clinical results in early and late cases for an index of its usefulness. Later, Stewart and Haselbauser investigated this preparation and found it neutralized virus only occasionally and then only in a ratio of 1 part of virus emulsion to 3 parts of serum. These workers also attempted without success to produce an antiserum from sheep. At the same time they also tested Rosenow's antistreptococcus serum, which has alleged therapeutic value in poliomyelitis, and found it to be devoid of any virucidal principles. This has been the experience of other investigators as well as ourselves.

In 1928, through the funds given by Mr. Jeremiah Milbank, we were enabled to try again the practical immunization of horses to produce a therapeutic serum. We began with injections of 1 cc. and gradually increased them to 50 cc. of a 10 per cent emulsion of the virulent spinal cord from monkeys. After 2 months' injections, horses which are able to produce the therapeutic serum have already developed a fairly potent antibody; in the course of 4 months the serum was as potent for the monkey virus as the human convalescent serum. When the injections were stopped we noted the surprising fact that the potency of the serum remained at a high level for 6 months.

Dr. Banzhaf, who had charge of concentration and refining of serums, undertook to refine the antipoliomyelitis horse serum. He used much the same methods that he and Felton have employed in refining pneumonia antibody. To the final preparation 0.5 per cent phenol was added and the whole clarified by filtering through paper pulp and a Berkefeld filter.

We have obtained a therapeutic serum of equal potency to the human convalescent serum in 6 different horses. The refining increases its strength four-fold and removes from it practically all of the serum sickness and chill-producing substances if any are present. With the serum we were able to experiment on monkeys from the standpoint of prevention. We found that the intraspinal injections were more effective with the same amount of serum than intravenous or intramuscular injections. We found that monkeys infected through the nasal route could be protected by a dose of serum given intraspinally several days after inoculation and as a preventive 1 week, 2 weeks and even 3 weeks before the application of the infecting substance to the nasal mucous membrane. These favorable results suggested the carrying out of the passive immunization of children. This is now being attempted.

CONCLUSIONS

It seems to me that anyone looking over the development of serum therapy in the treatment of poliomyelitis must realize that a change in opinion has already occurred. At first the use of convalescent serum was supposed to be beneficial not only in pre-paralytic cases but in acute paralytic cases and even in chronic paralytic cases. Now, as our knowledge has increased, the use of the serum has become more restricted. It is only during the epidemic of 1916 that pre-paralytic cases began to be frequently reported. Since that time as many cases as possible of pre-paralytic poliomyelitis have been given serum, and as these cases have done remarkably well the idea naturally developed that they would not have done so well if they had not received serum. The comparatively large number of cases treated in New York partly with and partly without serum show practically no difference between the two sets of cases. In a control piece of work done by Doctors Kramer and Aycock, they tell me the results have been practically identical.

As we are limited in making an early diagnosis of cases to those in which there are changes in the spinal fluid, we are practically always late in giving the serum treatment. In other diseases due to filtrable viruses, it seems that when the virus has actually invaded the cells serum therapy is of no value. Fortunately, about 75 per cent of cases seen in the pre-paralytic stage will never develop paralysis, and this is true whether they receive serum treatment or not. Intraspinal treatment is generally being given up because of the aseptic meningitis which occurs and which may be a serious detriment in cases of bulbar lesions. It is being replaced by intravenous or intramuscular administration.

At the present time, therefore, careful nursing and rest are the important things during the acute stage. In the prevention of the disease we have made some progress, and there is certainly hope that by active or passive immunization we may be able in the near future to prevent a considerable number of infections and give to parents an assurance which will remove their fears for their children.

It is advisable in any future outbreaks that we should carefully study both treated and untreated cases, so that we may finally have a united opinion regarding the efficacy of the treatment.

CERTAIN NOTEWORTHY FAULTS IN MEDICAL WRITING

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It is possible to read widely, to appreciate keenly, and to write much, but still to write inexpertly. It is also possible to conduct orderly research and to come to valid conclusions, but to present both methods and conclusions without evidence of order or of validity. These remarks apply to some extent to physicians and their published work. Only an occasional physician has undergone the voluntary discipline needed to make an acceptable writer, as judged by the standards of those who live by writing. Other matters, doubtless rightly but perhaps too exclusively, have taken the time and energy of the usual physician. Therefore, although authorship must be learned and cannot be taught, certain faults may more easily be avoided if attention is directed to them. I have chosen three faults, which seem to me especially noteworthy.

Planning

The most generally encountered deficiency in medical writing is the evidence it displays of lack of sufficient planning. I know it is said of Hazlitt that he never "thought for half an hour beforehand, as to what he should say on any given subject; or even as to the general manner in which he should treat it." However, he was a professional writer, and he thought for hours every day with potential preparation of articles in mind. Such persons may, and doubtless many of them do, develop mental habits of order and fidelity to a subject, which make an outline unnecessary, but the usual medical writer apparently needs a written plan. This applies even to preparation of short articles such as reports of cases, but especially to composition of monographs and books. In seven years of an active editorial service, I never have seen what I would consider an adequate outline, not even after the author, in talking over a proposed work, has admitted the necessity of one.

A single sheet, on which are scribbled or typed the words "definition," "history," "etiology," "pathology," and so on does not constitute an adequate outline. A paper of any considerable length, written under such meager guidance, is almost certain to contain weak repetitions or aimless digressions. The reader will find material concerning symptoms and signs, again under the heading "diagnosis;" and he will read material on complications after the author has informed him that the present subject is treatment of the primary disease. In some papers, also, the reader will be unable to detect any main line of thought, the paper will seem disconnected, fragmentary, a congeries of digressions. In the absence of a plan, moreover, the inconvenience to the author himself is considerable. Every time he sits down to write he must read again, what he has written. Even then he cannot keep it all in mind, and the result is confusion to him and to others.

In fact, a sheet of paper is nothing on which to write an outline anyway, nor is a half hour or a day sufficient time in which to assemble one. Cards are the convenient stationery, and a week, or a month, or a year, depending on the length or complexity of the work, the adequate time. This does not mean that an author should retire from the world until his report is complete; quite the contrary. I once knew an expert university librarian who, when she encountered a book of which the classification puzzled her, would read the book, or skim it through, put it aside for a month, and then, when she came back to it, would find that subconsciously she had considered the various puzzling aspects of her problem and would clearly perceive where the book belonged. In writing, likewise, periods of concentration alternating with periods of rest, of meeting with others, and of conversation, and above all the lapse of time, allow an effortless settling down and ordering of a subject that makes for facility in presentation.

An author who is writing a medical paper by this method will first think out the general plan of his article, including its main, big headings. Each of these headings he will write on a separate card, and, after he has arranged these cards in an order that for the time being appeals to him as logical, he will put them in a box in his desk. On the other cards, from time to time, he will write subsidiary headings, memoranda of what he has learned in the library, happy (not beautiful or smart) phrases and sentences, or perhaps whole paragraphs. These cards he will slip into the waiting box, behind their appropriate headings. He may carry a few cards in his pocket, and jot down suggestions as they come to mind in the course of the day. These, too, he will insert in their proper places in the growing outline. References he will enter, complete, on the backs of the cards to which they apply, and thus the bibliography will grow as the outline grows.

From time to time the author will spread out on his desk a whole division of cards in the outline, and shift them about if need be to attain more logical order or greater effectiveness. The outline is thus flexible and easily handled as it grows, repetitions are thrown out, and omissions discovered. As the work progresses the plan becomes "tighter;" subdivisions fall into place, transitions from one part of the subject to another suggest themselves, irrelevant material is discarded, and the outline is approaching completion.

By the time the actual writing is begun, few changes in order should be necessary. Cards representing chapters, large divisions, small divisions, and even paragraphs, have been banded or clipped together. The paper or the book is practically finished. Interruptions make no difference, for the writer needs to keep in mind nothing of what he has written. He need be occupied only with the small part of the subject noted or elaborated on the card before him. The continuity is in the outline; it does not have to be in his head, harassed as that may be by the details of a practice and a hospital service. Frequently it will be necessary only to connect material already fully expressed on the cards. However, these connections, or transitions, are important. They allow the reader to think in consonance with the author, and their absence has a great deal to do with the common deficiency in medical writing which I wish to consider next.

Point of View

There is nothing new to anyone in the concept of the point of view, but many medical writers have forgotten a principle that they learned before they entered high school. They then practiced writing description. They learned that if the man with the long rifle stood on the precipice overlooking the Mohawk Valley, the features to be described lay below and before, and that they must not describe the terrain behind and above, unless they told the reader, first, that the rifleman had turned around. Furthermore, the description of the valley must be orderly: from the most remote to the nearest below, or vice versa; from the general to the detailed, or vice versa; in fact, any reasonable order would do, so long as it was retained.

Medical writing is exposition, not description, but the same principles hold in general structure, in paragraph structure, and in sentence structure. If several series of experiments are to be "exposed" as our European visitors logically say, the reader should be told so. He should be given a point of view. Then, each series should be taken up, in order, and the reader informed when the point of view changes from one to the next. He must not be left high and dry, marooned without compass or sextant, when the writer has finished with one set of observations and starts to record the next, or when the writer suddenly wishes to compare a certain set of observations with a set made while he was studying in Europe fifteen years before. Yet, many castaways are still struggling to find their way through authors' reports, or having given up, have hired a Man Friday to wash glassware and are doing the work over again themselves, to discover what it is all about.

A common fault among medical writers is to establish a point of view and then abandon it, without any warning to the reader that it has been abandoned. The writer states, for instance, "There are three types of this condition," and names them. Then he elaborates on the first type. The reader has a right to expect that the author will next do one of two things: either he will elaborate also on the second and third types, or he will clearly state that he is not going to do so. Frequently he merely quits his classification after amplifying his first topic, goes to a new subject without warning, and completely mystifies his reader.

Paragraph structure can be passed with a word. The opening sentence usually should say what the paragraph is about, and the paragraph should be loyal to the opening sentence.

In sentence structure, however, adherence to the point of view, or lack of it, is frequently a matter of the nice order of words. Really, the foundation is laid in grammar, as far as modern English possesses any, and in rhetoric. But these are as far in the past experience of the usual medical writer as the multiplication table, and of much less definite memory. Consequently he can scarcely employ anything that he recognizes as grammar or rhetoric. Nevertheless, the reader probably can understand the paper if the author remembers what he is writing about until he reaches the end of his sentence. The surgeon who wrote the following had a short memory:

"His needle is threaded on to each of these free ends caught into healthy tissue on either side of the wound and then brought together and tied with the corresponding one on the other side."

Apparently, in the first place, the author had in mind not one needle, as he says, but two. The point of view, however, which is the main consideration here, shifts without warning from "his needle" to "free ends"; so that what the author actually writes is that a needle is brought together and tied.

A constructive precept or two may be of service on many occasions when the point of view becomes perversely lost in spite of the author's striving for a clear sentence: First, almost any sentence can be broken into two or more sentences. Second, repetition and parallelism, properly used, are graceful devices tending toward clearness and strength, not toward clumsiness and weakness in expository writing. Following is a sentence in which repetition and parallelism enable a number of involved facts to be presented clearly and strongly:

"A comparison of the votes in medicine and medical specialties in these four schools with the votes in surgery and surgical specialties in the same schools will show that in each instance the number of votes in surgery and surgical specialties was less than in those in medicine and medical specialties in the same school."

The principle of the point of view perhaps could be embodied in two commands: Remember what you are writing about, every minute. Let the reader know what you are writing about, every minute. Then grammar and rhetoric will to some extent take care of themselves. Then sentence structure, paragraph structure, and the structure of the whole will be considerably as they should be.

THE FACTS

Obviously, attention to planning and to the point of view is of little avail if the work on which the paper is based is inaccurate or inadequate.* This is hardly the place to go into that, but it is decidedly relevant here to insist that the paper must agree with itself. I would not dare to state what I believe to be true concerning the proportion of medical papers, submitted as finished and as verified by experts, which by internal evidence are medically or arithmetically inconsistent.

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* Dunn, H. L.: Application of statistical methods in physiology. Physiol. Rev., 1929, 9, 275.

There seems no sufficient reason why quantities in tables should disagree with quantities in the text, why the number of cases in different groups should not add to the quantity given as the total number of cases studied, or why percentages which are supposed to add to 100 should add to anywhere between 87 and 114. Yet mistakes of this sort are so common that it is never safe to assume that a medical author can count. Likewise, it seems unpardonable in an able physician to report clinical observations which, in plain but not intentionally offensive language, are nonsense. Yet this occurs. For example, I recall a report of a case of thrombosis of the right femoral artery. The author wrote that pulsations were normal in the palpable arteries of the right thigh and leg, that there were gangrene, trophic change, dependent cyanosis blanching on elevation, and coolness of the right foot, that pulsations of the palpable arteries of the left thigh and leg were absent, and finally, what had little to do with the case anyhow, that pulsations at the left wrist were normal. There is only one name for this sort of thing. It is carelessness, with appropriate adjectives to modify the noun.

Other errors are more understandable. An author may very well come to false conclusions because of lack of acquaintance with the manner of applying of statistical methods to investigative work. The day is not far off when these errors will begin to diminish as physicians come to realize that here is a laboratory tool as essential to the truth of their quantitative papers as blood chemistry is to validity of studies of nephritis. Before and after that time arrives, however, an author would do well to read and reread his finished article to determine if the material which appears in his summary has been recorded in the body of his paper, and if his conclusions are justified by his data, as far as he and the severest critics he knows can determine.

The Major and the Minor Considerations

Insufficient planning, failure to establish points of view as the thought progresses, and arithmetical and medical inaccuracy seem to me to be the outstanding faults of medical writing about which the author himself can do something. Although an occasional writer or an occasional long distance runner seems to appear fully qualified on his first effort, there is no more reason to expect that one who has talked English all his life can write it expertly, without training, than there is reason to believe that without training one who has walked all his life can win a marathon run.

However, if a qualified editor or publisher is given a manuscript in the writing of which the three major considerations I have mentioned have been attended to, he can attend to the minor considerations. He can supply headings and subheadings; cut cumbersome sentences in two; draw his pencil through superfluous words, phrases, sentences, and, if he dare, pages; eliminate slang, inversions, and attempts at spurious style; substitute adjectival forms when nouns are used as adjectives; make tenses, moods, voices, and persons agree, and render into English the hospital shorthand of laboratory reports. He can compare the cost of four necessary illustrations with that of twelve perhaps desirable but not essential figures which the author sent in, and he can twist tables around so that they can be printed. These matters are part of his job and he should not complain about them. He can even go further; he can, if a paper is very good, wear out his eyes over pages that are typed in single space, although after the first year he will not do so more than once a quarter, and he will not object to tearing away the manuscript covers that stationers, by some method known to stationers, contrive to sell.

A CLINICAL EVALUATION OF TRANSURETHRAL RESECTION OF THE PROSTATE

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Due to the untiring and painstaking work of Caulk, McCarthy, Davis and others, transurethral removal of the prostate has been established as a sound surgical principle. Just what its limitations are can be determined only by a frank analysis of the reports from urologists in general. This must necessarily exclude the reports from those doing resection to the exclusion of the open operation. A frank, unbiased discussion as to the proper place resection has in urological surgery must come from the calm judgment of those not wedded to any particular procedure but capable of doing whatever surgical step is required in the individual case. It is the purpose of this paper to frankly evaluate these two methods of relieving prostatic obstruction, outlining the limitations and advantages each enjoys. This study is based on an experience of fifty-odd resections. In 1926, I began using the Collings electrotome for relieving minor obstructions of the bladder neck. This instrument was used in combination with the McCarthy panendoscope and combined similar technical principles of the present electrotome. In considering the surgical relief of these old debilitated prostatics, admittedly below par physically, one should consider the procedure offering the most permanent ultimate relief with the lowest morbidity and mortality. If there is anything that has been learned in the handling of a "prostatic," it is that adequate drainage is of the most vital importance. This one factor has done more than all else to reduce the mortality in prostatic surgery. Therefore, to classify any surgical procedure on these poor surgical risks as a minor procedure to be done in one's office is forgetting all that the last two decades' experience has taught. Even simple catheterization may at times produce severe reactions, so that I feel it is a great mistake to pass over lightly the pre-operative care of these potentially uremic patients, a neglect which will undoubtedly account for many deaths otherwise preventable.

Preliminary Study

In selecting the case for prostatic resection a preliminary cystoscopic study is imperative. The degree of obstruction present may be ascertained by determining the amount of intravesical extension, whether the hypertrophy is confined to the median lobe or involves the lateral lobes, the length of the prostatic urethra and the degree of elevation of the bladder neck. Contracture of the vesical neck and subcervical gland involvement may also be determined by cystoscopy. Estimation of the amount and degree of prostatic obstruction by rectal palpation is unreliable, as rectal palpation may indicate but little hypertrophy even in the presence of acute urinary retention.

Indications for Resection

It is generally agreed that the greatest field for resection is in the early obstructive cases before evidence of back pressure is manifest on the cardiovascular and renal systems. It is in the early detection and correction of incipient obstructions of the bladder neck that the most fruitful collaboration between general practitioner and the urologist is effected. In posterior commissural hypertrophy, in sclerosis of the bladder neck, in median bar formation, in moderate bilateral lobe enlargement and in malignancy of the prostate, resection offers very favorable possibilities. These comprise approximately 90 per cent of all obstructions. Caulk uses it in 90 per cent of his cases, and at the Mayo Clinic in 1931 it was used in 41 per cent of all cases and in 1932 the incidence of resection is much higher. Successful resection demands infinite patience, skill as an instrumenteur, an intimate knowledge of the topography of the posterior urethra and bladder neck and a wide experience in the pre-operative handling of the "prostatic." Due to the marked enthusiasm being exhibited all over the country over resection by urologists not experienced in doing the open operation, the method will undoubtedly suffer as a result of use in inexperienced hands and by those lacking the prerequisite knowledge commensurate with the necessary technical ability. When one visualizes the obstructed bladder neck as a tube and understands that the caliber of the prostatic urethra is approximately 10 to 15 millimeters, it is easy to see how a very small amount of prostatic tissue will completely occlude this tube. It is in the recognition of this anatomical principle that resection offers its greatest possibilities.

One of the most favorable fields for resection is in the presence of carcinoma of the prostate. Prostatectomy has been very disappointing in this condition, whereas a resection affords the operator the means of keeping the urethral lumen patent by removing tissue from time to time as the tumor encroaches on the caliber of the urethra. There also seems to be some inhibitory action from the effect of the diathermy current on the cancer cell. The fact that we have a means of replacing the offensive-smelling suprapubic drainage will be greatly appreciated by these unfortunate victims.

Bumpus points out that reports from a large urological center show that 25 per cent of the cases there had a poor functional result following prostatectomy. In these cases resection offers a means of correcting a partially occluded bladder neck, and thus allows the bladder to regain its normal ability to empty.

Contraindications

It has been stated that resection is particularly advantageous in markedly debilitated cases, i.e., poor risks for prostatectomy. This is true, although one occasionally has to do a preliminary cystotomy affording drainage over a long period of time before the vital functions have been restored to their maximum capacity. At this time the removal of the obstruction may be done with little risk. In the case of the large, vascular prostate, it is generally agreed that prostatectomy is the procedure of choice. The majority of the deaths reported following resection are the result of infection rather than hemorrhage. This may be readily understood, as the posterior urethra affords vast possibilities for systemic absorption. Caulk points out that the obstruction is the result of inflammatory hyperplasia, so that the danger from infection is always present and frequently asserts itself if extensive coagulation is required to arrest hemorrhage. As a result of the secondary slough, pyelonephritis may be seen, and unless the drainage is adequate serious renal infection may ensue. Following resection, edema of the bladder neck occurs and rarely subsides under 2 weeks, so that the patient must be watched carefully to prevent secondary absorption from the lack of drainage. In my cases I have found that postoperative pain is proportionate to the amount of cauterization required. This pain may persist for 2 to 4 weeks following resection if extensive cauterization is required. The pain is in the rectum and is associated with the passage of mucus,

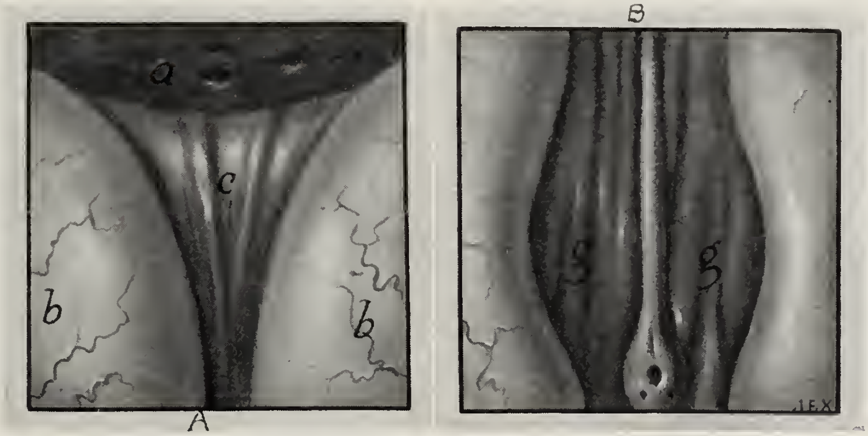

Fig. 1. (*A*) Cystoscopic View of the Blalder Neck in a Case of Moderate Bilateral Lobe Enlargement with Some Involvement of the Median Lobe. (*B*) View of the Bladder Neck Following Resection, Showing Obliteration of the Lateral Lobes and Median Lobe

which is undoubtedly due to the opening of multiple infected prostatic glands. It is better, as McCarthy points out, to let the patient leave the table with the urine still slightly blood-tinged rather than attempt extensive cauterization for bleeding, as a large catheter will usually control any minor oozing. Patients presenting a rather severe prostatitis must be given careful preliminary treatment, since they bleed more freely during resection and may not entirely clear up after operation.

"Catheter fever" is occasionally seen and occurred in two of my cases, necessitating a preliminary cystotomy to control the septic temperature. The presence of vesical diverticula, found in 5 per cent to 7 per cent, and vesical calculi, seen in 10 per cent to 15 per cent, may not contraindicate resection, since the former may be removed through a suprapubic incision not distorted by scar tissue and the latter can be removed by lithopaxy if not too large. Those performing resection should be experienced in prostatic surgery, since conditions may occur which require prompt surgical interference. Resection itself is a highly technical procedure, however, and demands even more skill than a prostatectomy.

Description of Instruments

My experience is confined to the use of the Collings, McCarthy and Stern-Davis techniques. I have not used any of the various punches in this series of cases. Bumpus points out that adequate visualization of the operative field, control of hemorrhage and an apparatus capable of removing sufficient tissue to relieve the obstruction are essential to insure the best results. The vision of the pan-endoscope is amphitheater in type and gives wide visualization of the neck of the bladder. The Stern instrument presents the operative field at right angles to the operator, and may be preferred by those lacking familiarity with the McCarthy telescopic vision. The amount of tissue removed with each bite with these instruments is approximately an inch long and may weigh as much as one gram. It is quite feasible to remove from 15 to 20 grams of tissue by resection, which ordinarily suffices even in the presence of rather large obstructions. I have obtained much more satisfactory control of bleeding during the operation by using one of the new spark gap surgical units. There is an adequate amount of current for any cutting purpose, and in my hands hemostasis is much more easily secured with this type of current. Two new spark gap units have just been placed on the market. The manufacturers placed these units at my disposal, and after using them in numerous cases I find that they satisfy the most exacting demands, both for cutting and coagulating. Both have four spark gaps, which have increased the cutting power of the unit. This is a distinct advance in this field.

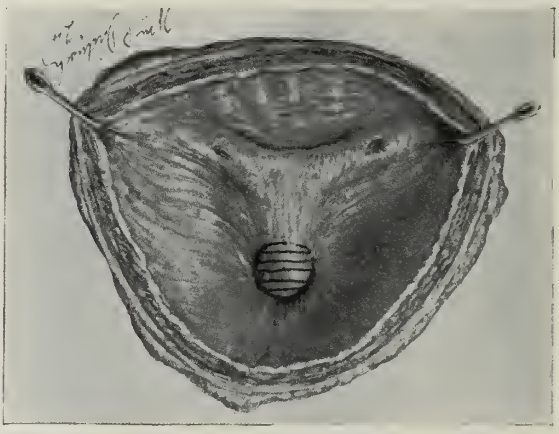

Fig. 2. Shaded Area Shows How Little Prostatic Tissue is Required to Completely Occlude the Vesical Outlet

This type of case is ideal for resection. Courtesy of Young's Urology.

To those trained to the Braasch type of instrument, the Braasch-Bumpus punch is eminently satisfactory, and one may quickly remove whatever amount of tissue is necessary to relieve the obstruction. Bleeding is controlled by preliminary electro-desiccation with fulguration of the individual bleeding points after the bite is taken.

Principles Governing Resection

The success of prostatic resection depends on the following points: First and chiefly, the amount of experience in doing resections; (2) a slow, deliberate excursion of the loop through the obstruction is required to minimize bleeding; (3) sufficient tissue must be removed in the median line to create a wide and deep gutter on a level from the veru montanum to the bladder trigone; the residual urine is thereby effectively removed, resulting in the amelioration of the bladder symptoms and recession of the congestion; (4) arrest of hemorrhage by individual fulguration of all spurters is essential, leaving the bladder washings free from hemorrhage; (5) a large, indwelling urethral catheter, preferably 24 F. to 26 F. with multiple openings should be used with careful instructions to keep it open; this obviates the bladder spasm which may promote further bleeding. All bleeding points should be arrested at the end of each cut, thereby obviating the loss of blood. This permits the necessary visualization of the operative field and lessens the possibility of technical complications. Hemorrhage has never been a serious factor in my cases, and I have not found it necessary to use any special electrodes for hemostatis. Spinal anesthesia is a simple and efficient anesthetic for resection. When given low and fortified with epinephrin, there is very little disturbance of the blood pressure. Lately I have been using 10 to 20 mg. of pantocain instead of novocaine crystals. The duration of this anesthetic is two hours or longer, which is adequate for the most extensive resection. There have been no untoward reactions in the use of this new anesthetic. There has been less nausea and postoperative headaches since pantocain has been used. Lundy has found it to be three or four times less toxic than nupercain and almost as effective. Formerly I used combined sacral anesthesia but found it less satisfactory and more trying to the patient than spinal anesthesia.

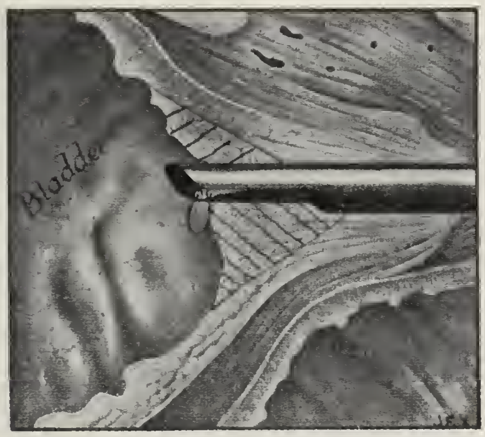

Fig. 3. Sagittal Section of the Bladder Neck in a Case of Early Median Lobe Enlargement with the Electrotome in Place Ready for Resection

Shaded area represents the site of resection.

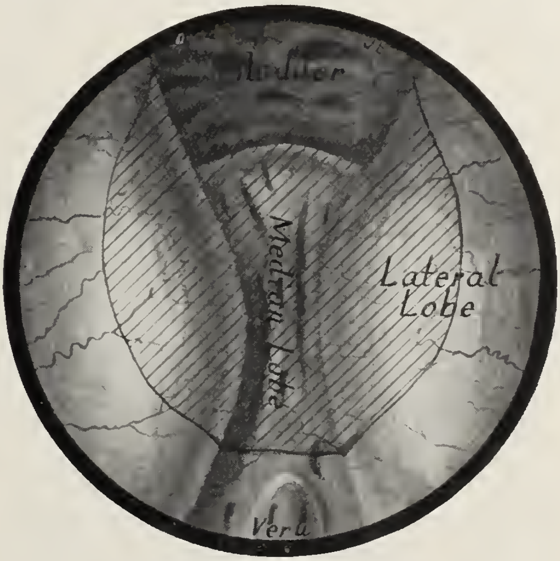

Fig. 4. Cystoscopic Picture of an Actual Case Seen with the Straight Vision Telescope

This shows marked irregular enlargement of the lateral and median lobes with elongation of the prostatic urethra. The bladder shows marked trabeculation and contained 120 cc. of infected residual urine. The shaded area was resected.

In one or two of my early cases, insufficient tissue was removed to relieve the residual urine, and a second resection was necessary. In one case with a very large prostate a third resection was necessary, only two cases requiring repeat operations. A sufficient time should elapse if a second resection is contemplated to permit the urethral mucosa to be restored to normal, since the re-introduction of the instrument into an infected field is not without danger of producing an upward extension of the infection. The ultimate permanent expectancy following resection can only be determined by follow-up records, though cures have been reported lasting over five years.

Postoperative Care

Postoperative bleeding will rarely be found severe or alarming if care is taken to keep the catheter open. Only nurses understanding this feature should handle this type of case. The convalescence following resection is much shorter than in prostatectomy, although an occasional elevation of temperature is noted which usually subsides in two or three days. There is usually some pain in the neck of the bladder and in the rectum for as long as three or four weeks, the severity of which depends on the degree of coagulation required. Usually this pain gradually subsides at the end of the third week and is never as severe as that following prostatectomy. The urine is usually cloudy and contains much debris; often frequent lavage is necessary to clear up the infection. If sufficient tissue has been removed to give adequate drainage, the residual urine gradually lessens and at the end of four to eight weeks is entirely relieved. The indwelling catheter is left in situ for three to seven days, depending upon the case. Following withdrawal of the catheter, urination is usually prompt and satisfactory; if not, the catheter should be quickly replaced and drainage again instituted to obviate pyelonephritis from back pressure.

Advantages of Method

The ultimate aim of any procedure for the cure of obstruction of the neck of the bladder is the prevention of residual urine and functional restoration of urination together with restoration of the vital functions necessary to the well-being of the patient. It is possible to resect even a large intravesical prostate, which was done in several of the cases of this group, but I feel that this type of obstruction can best be handled by prostatectomy.

As we gain in experience and realize the limitations of this method, keeping in mind that resection is not a minor procedure, it will gain in popularity and achieve its merited place as a valuable adjunct to prostatectomy. We are frequently asked, what if there is a recurrence of the obstruction? Even if it has to be repeated in a period of years, patients will prefer this to prostatectomy. At the present time it is agreed that a large gutter through the floor of the prostatic urethra suffices to relieve the obstruction and do away with residual urine. Only time will determine whether or not removal of the lateral lobes is also necessary to produce a permanent cure.

The economic saving to the patient in the reduced hospital period and nursing care is also a consideration. The average stay in the hospital is less than ten days. The average in my cases has been eight days, and some patients have remained in the hospital only three days. This saving of from four to six weeks is one of the most powerful arguments advanced in favor of transurethral removal of the obstruction.

Conclusions

1. The indications for resection over prostatectomy are rather definite and clearcut, and include all minor obstructions at the vesical outlet and malignancy of the prostate.

2. In the large, vascular, intravesical type of prostate, prostatectomy is the method of choice.

3. In the early detection and removal of prostatic obstruction resection has great possibilities, obviating the impairment of the vital systems so often seen following complete blockage.

4. The average stay in the hospital is approximately ten days, which saves the patient considerable time and money.

5. Prostatic resection is a valuable adjunct to prostatectomy but will not replace it. The same careful preparation with decompression and building up of the cardiac and renal systems is required in resection as in prostatectomy.

6. Resection of the prostate gland is a highly technical procedure, and should be undertaken only by those capable of handling any surgical complication which may ensue.

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THE TYPHUS-SPOTTED FEVER GROUP

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This group of diseases comprises a formidable array of clinical entities occurring on all the continents and bearing diverse local names. The inter-relationship of the individual members is being gradually clarified by clinical, epidemiological, immunological, and pathological investigations.

In this country three distinct members of this group are encountered, viz., epidemic typhus, endemic typhus, and spotted, or tick, fever.

Epidemic Typhus

Several large epidemics of typhus fever have occurred in a number of our Atlantic and Gulf Coast seaports during the past century. These were mostly traceable to recently arrived immigrants from the Old World. Because of improved quarantine procedure during the past few decades, outbreaks of this disease have not spread beyond immigrants in detention. This form of the disease is transmitted from man to man by the body louse. It is characterized by a high degree of communicability and high mortality. In former years also, tabardillo, the louse-borne typhus of Mexico, occasionally was imported into this country, with resultant localized outbreaks.

Endemic Typhus

A mild form of typhus fever is endemic largely in the cities of the Atlantic and Gulf Coast states. This disease was first observed by Brill in New York City, in 1897, and was differentiated by him from typhoid, with which it had been confused until then. Since its recognition, endemic typhus, or Brill's disease, has been observed with increasing frequency in the affected area. Its source and mode of spread remained a mystery until recently, when medical officers of the Public Health Service through field and laboratory studies demonstrated that the virus of the disease is maintained in nature in the form of subclinical infections of wild rats and is apparently transmitted accidentally to man by the rat flea.

Although reservoirs of this disease exist in cities both to the north and to the south of Washington, there is as yet no evidence that it might have become established in this City. A few cases have been observed here, but these were all imported from cities of known endemicity. It is possible that this disease represents the interepidemic survival of the more highly virulent form of the disease that has appeared from time to time in epidemics. Endemic typhus reaches its peak during the late summer and fall, though cases occur the year round. Males of the middle age groups are most subject to the disease, because of occupational exposure to infection; food handlers are especially prone to it. No social stratum is exempt. The disease is sporadic, and secondary cases have not been observed. A single focus of infection may, however, produce multiple cases.

The incubation period is from 6 to 14 days. The onset may be abrupt, with a chill, slight fever, dizziness, headache, anorexia and prostration, or it may be gradual with irregularly developing symptoms.

The temperature rises in step-like fashion each afternoon, reaching 102°F. to 105°F. in from 3 to 7 days, with morning remissions of 1°F. to 3°F. The fever usually lasts 14 days, terminating by rapid lysis.

The rash appears as a rule on the fifth day over the lower chest, anteriorly and laterally, over the upper abdomen, and frequently also on the medial aspect of the arms. The back may be involved next, or there may be no further extension; occasionally the rash becomes generalized, though scanty on the extremities. The face, the palms, and the soles are rarely involved. The rash consists of macules varying from a rose to a dull red color, 2 to 4 millimeters in diameter, with rather poorly defined margins. On pressure, these lesions fade, but usually do not disappear completely. Occasionally, some of the lesions are papular. Rarely, petechiae are observed. The eruption lasts from 2 days to a week, and leaves no trace by the time of defervescence. Now and then a case is seen in which no rash is discernible at any stage.

At the height of illness the face is flushed, the tongue dry and coated, the conjunctivae inflamed. The pulse tends to be slow in ratio to the temperature. The spleen is seldom palpable. The more severe cases often have a peculiar mouse odor. The commonest symptoms are prostration, severe headache, usually frontal, constipation, nausea, low backache, leg pains, generalized aching, unproductive cough, photophobia, night sweats and sore throat.

The psyche is often normal throughout. Most often there is some apathy, which may alternate with periods of irritability and insomnia. Occasionally there is an evanescent, mild delirium.

The leukocyte count is within normal limits or is moderately lowered. Rarely, a low grade leukocytosis occurs. The blood serum agglutinates *B. proteus* X_{19} after the first week.

Convalescence is speedy except in old persons. The case fatality rate is less than 1 per cent.

The treatment is symptomatic. A vaccine which gives some promise of prophylactic efficiency is now in process of development at the National Institute of Health.

Spotted Fever

Spotted fever, or tick fever, has been recognized in the northwestern states for over 40 years, and until recently was thought to be confined to that region, whence the designation Rocky Mountain spotted fever. Two clinical types were early recognized, viz., the highly virulent Bitter Root Valley type, with a mortality of about 75 per cent, and the mild Idaho type, with a 5 per cent mortality. In other adjacent areas the case fatality rate has averaged approximately 25 per cent. The disease is transmitted by the bite of an infected wood tick.

In the course of recent studies of endemic typhus in the eastern states, it was noted that certain cases giving a positive Weil-Felix reaction presented an epidemiologic and clinical picture strikingly different from Brill's disease and resembling in all essential respects the spotted fever of the Rocky Mountains. Laboratory studies proved the immunologic identity of this disease with the western disease. This clinical entity has been tentatively designated the "Eastern type." It really is not, as has mistakenly been supposed, a disease of recent appearance in this section, but has been present in the region east of the Appalachians for well over 20 years. The earliest known cases apparently originated on sea islands off the Atlantic Coast. In former years most of the cases were diagnosed black measles, meningitis, or typhoid, and in recent years (since the introduction of the Weil-Felix reaction) also typhus. These diagnoses are still frequently made; in fact, only a minority of the cases are even now diagnosed correctly.

This type of spotted fever is presumably transmitted by 2 or 3 varieties of ticks, of which the common dog tick is probably the most important as vector. The mode of infection is by the bite, or by the crushing of engorged infected ticks.

The occurrence of this disease coincides with the tick season, namely, the late spring and the summer months, although occasional cases are seen out of season. Children constitute a large proportion of the cases. The disease is of rural origin, being most prevalent in wooded areas. Spotted fever tends to recur in the same locality, sometimes year after year, sometimes after a lapse of several years. Several such focal areas exist in the vicinity of, and even within the boundaries of, the District of Columbia.

The incubation period is from 2 to 12 days, being usually less than a week. The onset is, as a rule, abrupt. The initial symptoms are much the same as in typhus, but there is greater prostration and generalized aching. Frequently there is also pain in the neck, and occasionally abdominal pain. The fever, while running a typhus-like course, reaches higher levels, and in severe cases the remissions are slight or absent. It lasts from 2 to 3 weeks, the average duration being longer than in typhus. Mild cases may regain normal temperature in 10 or 11 days. Yater and Mattingly suggest the possibility of the occurrence of abortive cases.

The rash appears usually on the third or fourth day, at first on the ankles and wrists. It then involves the rest of the body surface, progressing centripetally. The palms and soles are usually involved, the face frequently, the scalp occasionally. The extension is complete in 2 or 3 days, and no part of the body surface may be spared. The early stages of the rash may be readily overlooked in persons who are deeply tanned. The earliest lesions are faint roseolous macules, 2 to 8 millimeters in diameter. These may fade in the morning and reappear with the afternoon rise of fever, gradually growing more distinct; they are frankly petechial by the middle of the second week in nearly all cases. When fully developed, the rash is purpuric and some of the lesions may become confluent. The rash is most intense and most abundant on the ankles, wrists, legs, upper back, shoulder, lateral surfaces of the arms, and buttocks, in the order mentioned. The rash often persists for days or weeks after defervescence, as dusky purplish or yellowish brown spots, which are accentuated by baths or by application of a tourniquet. A branny desquamation, especially over the legs, may be sometimes observed late in the disease or early in convalescence. Along with the development of the exanthem, hemorrhagic spots, 2 to 4 millimeters in diameter, frequently appear on the buccal mucosa, and particularly over the palate.

The tongue is dry and coated in the center, with dark red border; the papillae are sometimes markedly enlarged, giving the tip and edges a mulberry-like appearance. The pharyngeal mucosa is usually inflamed. Small ulcers occasionally develop on the fauces, tonsils, or palate. The face is flushed and often dusky. The eyes are injected. Occasionally there is marked edematous swelling of the face, hands, feet and genitalia. Rigidity of the neck, with presence of Kernig's sign, is frequent, especially in children. The spleen is usually enlarged and tender. The pulse is more rapid than in typhus. A very fast pulse is of grave prognostic significance.

The symptoms are much like those of typhus, with the addition of more nausea and vomiting, pain in the back of the neck, and muscle and joint pains. Central nervous system disturbances tend to be severe. Meningismus is common in the early stages. Hyperesthesia and tremors are noted occasionally. Lethargy and irritability may be followed by stupor and violent delirium and even coma. There may be loss of sphincter control.

The leukocyte count in the early stages remains within normal limits; in the later stages there is, as a rule, a definite leukocytosis. The erythrocyte count often falls as the disease progresses. The urine may contain albumin and casts. The Weil-Felix reaction is usually, but not invariably, positive.

Recovery is often very slow. Mental confusion, visual disturbances and deafness are the commonest complications, and may be very slow in clearing up. The case fatality rate is about 22 per cent.

Treatment is symptomatic. Baths and sedatives may help to quiet the patient and help conserve his strength. Western physicians favor the use of caffein and digitalis as cardiac stimulants when indicated. It is important that an adequate fluid intake be maintained.

Prevention at the present time must depend largely upon personal prophylaxis. When known tick infested areas are entered during the spring and summer, it is advisable to wear such clothing as will compel the ticks to crawl up the outside of the clothing. For this purpose high boots, leggings, or socks worn outside the trousers are desirable. The ticks may then be detected upon contact with the skin of the neck, or before reaching it. In addition, an examination of the entire body, especially the hairy parts, and also of the inside of the clothing, should be made at least once during the day and again upon retiring. Ticks seldom attach immediately and usually are not infectious until after they have been attached for several hours. After removal of attached ticks, it is customary in the West to cauterize the spot with silver nitrate pencil or nitric acid. A substantial measure of protection is conferred by the vaccine developed by the Public Health Service.

Differential Diagnosis

The occurrence in this part of the country, side by side, of two such closely related diseases as typhus and spotted fever presents new problems in differential diagnosis. In addition, typhus must be differentiated from typhoid and influenza; and spotted fever from streptococcic infections and, in the cases characterized in the early stages by meningismus, from meningitis. As between endemic typhus fever and spotted fever, a careful consideration of the complete clinical picture and of the epidemiologic features involved should leave no doubt as to the identity of the disease in any but the exceptional case.

Agglutinins for *B. proteus* X_{19} appear in the blood of practically all cases of typhus and in most cases of spotted fever. Agglutination in dilutions of 1:80, or higher, is generally considered significant. The reaction usually becomes positive in the second week. This reaction is not absolutely specific, however, in the hands of all workers, and may occasionally be positive in moderately high dilutions in febrile conditions other than typhus or spotted fever.

Other more involved and less available laboratory procedures may at times be invoked in establishing a diagnosis. The virus in some cases may be recovered from the patient's blood by inoculation of experimental animals, particularly guinea pigs. When such inoculation succeeds in producing infection, the reaction in the animal, the resultant pathology, development of agglutinins, and cross-immunity tests with known strains may serve to identify the disease. Another diagnostic aid is available in the protection test, which is accomplished by testing the protective properties of the serum of a recently recovered patient against infection of a laboratory animal with a known virus. These procedures are of considerable value but subject to obvious limitations in application. The practicing physician must rely mainly upon careful history taking and thorough clinical observation, utilizing the well established and readily available laboratory procedures.

Science Series. No. 9

CHEMO-MEDICAL STUDIES OF PATHOLOGICAL CONDITIONS

M. X. Sullivan, Ph.D.

Chemo-Medical Research Institute, Georgetown University

Activated by strong humanitarian motives, the late George Lawrence Coyle, S. J., endeavored for a number of years to found at Georgetown University a Chemo-Medical Research Institute. Finally, aided by a special grant from the Chemical Foundation, Francis P. Garvan, President, sufficient funds were obtained to make a start, and the Chemo-Medical Research Institute was founded at Georgetown University February 1, 1931, with quarters in the Medical School. The motive of the Institute is the general chemical study of various diseases.

Since the founding of the Institute, three main lines of research have been carried on: (A) The sulphur metabolism in health and disease; (B) the study of the urine in cancer and the development of tests of value in the early diagnosis of cancer; (C) the development of more specific tests for amino acids, amines, and other biologically important constituents of body fluids and excretions.

(A) *Sulphur studies.* At the present stage of our knowledge the study of sulphur in relation to vital activities revolves around cystine, cysteine, glutathione, methionine, and ergothioneine, especially around cystine and its congeners, cysteine and glutathione. Of the rôle of methionine and of ergothioneine little is known. For the cysteine system, Sullivan (1926) developed a colorimetric reaction of the highest specificity and applied it to the quantitative estimation of cystine in foodstuffs, etc. (1929), (1931). The Sullivan reaction is primarily a cysteine test but can be used for the estimation of substances which yield cysteine by reduction, by hydrolysis, or by a combination of these processes, for example, cystine and glutathione or other cystine complexes.

In preliminary work there was found in the urine of several cases with extensive cancer large amounts of compounds containing loosely bound sulphur, that is, compounds readily giving a black lead sulphide when warmed with lead and sodium hydroxide. Early cases of cancer, with small localized growths, showed much less loosely bound sulphur in the urine, and the normal under the same condition showed only a trace. Because the sulphur in methionine and in ergothioneine is not loosely bound, the lead blackening sulphur of these urines must come from some cystine complex or similar loosely bound sulphur compounds.

Since work by a number of investigators has shown that sulphur compounds play an important rôle in nutrition, in the inner metabolism of the body, in cellular respiration, oxidation and reduction, and in biochemical defense, considerable attention has been paid to sulphur and cystine in the work of the Chemo-Medical Research Institute. The main lines of investigations are covered by the following broad projects.

1. *Detailed sulphur researches.* In continuation of the investigation of sulphur and cystine to vital activities, studies were made on insulin, secretin, thyroglobulin, and various enzymes; on the nature of the sulphur compounds in the lens of the eye, normal and cataractous; on a comparison of various methods of determining cystine; on methods of estimating glutathione in tissue, etc.; on experimental cystinuria; on the cystine content of finger nails in arthritis. These studies have given fruitful results which will be detailed in separate papers, since some of the lines of work have no direct relation to pathological conditions. From a medical standpoint, however, it may be said that in arthritis the cystine content of the finger nails is considerably below normal and increases with improvement in the clinical condition.

2. *The study of a polypeptide in normal and pathological urine.* There occurs in urine complex material of a polypeptide nature known as oxyproteic acids. Normally, they are present in considerable amounts, at least 2 to 3 grams to the liter. They are not precipitated by heat and do not give a ring test with nitric acid. Accordingly, the oxyproteic acid fraction would be missed clinically. Whether a simple substance or a mixture of substances, which is more probable, the oxyproteic acid fraction is soluble in water and alcohol and forms a barium salt which is soluble in water but insoluble in alcohol. This fraction has been reported increased over the normal in cases of cancer, in tuberculosis, and in pregnancy.

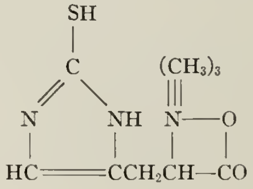
A few cancer urines tested for oxyproteic acid contained considerably more of the complex material than normal urines. The work, which is rather tedious, did not lend itself to clinical testing, and this study was put aside temporarily while attention was focused on tests more readily useful clinically. The barium salt of the oxyproteic acid contained sulphur, loosely bound, but little cystine. Experiments showed that the oxyproteic acid fraction might lead to erroneous conclusions in the colorimetric estimation of uric acid since like uric acid it is precipitated by silver lactate, is extracted similarly by acid sodium chloride and reacts more or less with the uric acid reagents. The finding that the oxyproteic acids might interfere in the colorimetric estimation of uric acid has led us to a search for a more specific test for uric acid. Definite evidence was obtained that the oxyproteic acid fraction interferes in the estimation of sulphocyanate in urine. This interference will be detailed later.

3. *Urinary proteose.* In normal and pathological urine there occurs a substance or substances giving proteose reactions to some degree. To obtain the so-called proteose, the urine is acidified with sulphuric acid until acid to congo red. The mixture is then shaken with 100 cc. of ether. Two layers form, an ether layer partly emulsified and an aqueous layer. The aqueous layer is discarded. To the ether layer are added 100 cc. of 95 per cent alcohol. The precipitate which occurs is allowed to settle and is collected by centrifuging or by filtering by suction on hardened paper. Oriel and Barber (1930) claim that this fraction is the carrier of antigenic properties in various allergical conditions, hay fever, asthma, urticaria, psoriasis, etc. Using the Oriel and Barber procedure, we extracted the proteose from the urine of a large number of persons affected with various allergic conditions. The reports from the attending physicians have not given much support to the claims of Oriel and Barber, since most of the tests were questionable. In some cases, positive skin tests were obtained with the proteose, and in a few cases evidence of desensitization were obtained on subdermal injection of minute doses of the particular proteose. If the findings had indicated strongly that the proteose was the carrier of antigenic properties we would have made a study of the question in cases of cancer in general and in various types of malignancy.

4. *The study of decomposition products of nucleoprotein.* Preliminary investigations on the urine of known cases of cancer showed the presence of decomposition products of nucleoprotein, beta nucleic acid in particular. In some cases simpler decomposition products of nucleic acid were isolated from the urine of cancer patients but not of normal people. To this field special attention will be given, but for the present it is laid aside in the endeavor to devise and authenticate tests more useful clinically.

5. *Sulphocyanate in the urine.* Saxl (1913) concluded that quantitatively sulphocyanate was increased in cancer with values appreciably higher than normal and higher than in any other disease. He employed the Rupp-Schied (1902) method as improved by Thiel (1902). Using the same method, we found increased amounts of sulphocyanate in the urine of some cancer cases while in other cases we did not. In making a critical study of this reaction and the possibility of other substances giving the same reaction with iodine that sulphocyanate does, we found in the urine a compound hitherto unreported. This compound, ergothioneine, previously found in the red blood cell, behaves like sulphocyanate in the method employed to determine sulphocyanate and makes previous quantitative work on sulphocyanate questionable. Oxyproteic acid is likewise precipitated by silver nitrate and reacts with iodine in alkaline solution in the same way that sulphocyanate does. Methods, however, have now been devised for the separate estimation of both sulphocyanate, ergothioneine, and oxyproteic acid, etc., and are being applied to their determination in the urine in health and disease.

6. *Ergothioneine.* This sulphur compound isolated from blood by Benedict (1925), Benedict, Newton and Behre (1926), Hunter and Eagles (1925), (1927), was found by Newton, Benedict and Dakin (1926) to be identical with the bases ergothioneine isolated from ergot by Tanret (1909) and shown by Barger and Ewins (1911) to be the betaine of thiohistidine.



Benedict, Newton and Behre showed that ergothioneine is precipitated by silver lactate in the presence of lactic acid, but that unlike uric acid is not freed from the silver compound by treatment with acid sodium chloride used in the Folin-Wu (1919) method for uric acid. The silver insoluble complex freed from uric acid and dissolved in sodium cyanide gives a blue color with the uric acid reagent and sodium hydroxide. By use of suitable standards of ergothioneine the amount in urine can be estimated readily. Ergothioneine-like substances were found increased on the average in the cancer cases studied, but this fact does not aid diagnosis, since these substances may be below normal in some cases of cancer and have been found increased in some cases of arthritis.

(B) *The development of tests of value in the early diagnosis of cancer.* In the studies on urine an endeavor has been made to get a colorimetric reaction which would be of value in the diagnosis of cancer. In a number of cases of cancer evidence was obtained of the presence in the urine of nucleoprotein fission products. Attention was focused on developing color reaction for such products. Finally, a simple colorimetric reaction was devised which has been tested in cancer, in non-cancerous cases, and in normals. The results to date are:

CONDITION	NUMBER TESTED	POSITIVE	NEGATIVE	PER CENT POSITIVE
1. Cancer cases	50	45	5	90.0
2. Other pathological conditions	52	5	47	9.6
3. Normal	45	0	45	0.0

These results were taken merely to indicate that a reaction of value in the early diagnosis of cancer can be developed. The chemistry of the reaction is not yet fully known, but in making a survey of a long list of substances it was found that a similar red color is given with our reagents by organic and inorganic nitrites, aminoguanidine, and by hydroxylamine after warming with alkali. In order that undue hopes be not aroused, attention may be called to the fact that as yet we do not know the validity of the reaction as a useful agent in the diagnosis of cancer. We have some evidence that it has some value but would rather defer judgment until a large number of cases of cancer and other conditions have been tested under controlled conditions. Accordingly, for the present we shall defer detailing the reaction until enough cases have been studied for statistical treatment. The work is being continued and will be described in detail later.

(C) *The development of more specific tests for amino acids, amines, and other biologically important constituents of body fluids.* Occasion was offered us to study the constituents of the cancerous part of human stomach as compared with the neighboring relatively sound part, and of cancer nodules of a liver compared with the relatively normal portion. The glutathione and cystine content of the cancer in both cases was of the same order as the sound portion of the organ. In making other tests it became evident that new and more specific tests must be devised for various amino acids, amines, etc. A start has been made on this project, and more specific tests for uric acid, for the amino acid proline, and for guanidine are being developed. This work is detailed and time consuming but absolutely necessary. With proper, well authenticated, well regulated tests for biological constituents, a wonderful field of great promise will be opened in the study of pathological conditions, cancer in particular.

The different phases of the work outlined in this report will be given in detail in later publications.

The author wishes to express his gratitude to the authorities of Georgetown Medical School and especially to the Regent, Rev. John L. Gipprich, S. J., for interest and aid, and to Georgetown and Gallinger Hospitals and various members of the medical profession for clinical material.

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SPECIALIZATION IN MEDICAL FIELDS

A specialist may be defined as a practitioner who devotes himself to a special class of diseases. Specialism, therefore, is defined as devotion to a special department of medicine or surgery. Until quite recent times all that was required to practice a specialty was the announcement that the doctor would limit his practice to this, that or the other line of work. He was accepted at face value and little thought was given as to his fitness to practice in his chosen field. Perhaps the one outstanding exception to this rule, in years past, was the specialty of ophthalmology. A little later the otolaryngologists found it necessary to take special courses of instruction in order to enter this field and to meet the competition of others in the same line of practice. In the field of otolaryngology, in the beginning, special preparation was brought about largely because the ophthalmologists at that time combined with their specialty the practice of otolaryngology, making it possible to take the two courses concurrently. The next influence, chronlogically leading to definite preparation for the practice of a specialty was the organization of local and national special societies devoted to a consideration of some one branch of medical practice. To gain admittance into these societies the candidates were compelled to have had comprehensive training and experience, technical and clinical, in the department of medicine with which these societies concerned themselves. For a time many specialists did not feel the necessity for gaining the recognition and receiving the stamp of approval of such outstanding organizations. However, as time passed physicians in general practice began more and more to seek their consultants from among those who had been deemed worthy to be received into these special societies. This trend proved to be the strongest incentive to a more careful preparation for practice in a limited field.

Another and far greater influence for comprehensive preparation for a chosen specialty was an awakening on the part of the public to the difference between treatment based on sound training and experience and that of a more superficial nature. This enlightenment of the public appears to have had its earliest inception in the publicity that meetings of special societies gained through the appeal which the coming together of distinguished clinicians made to the press. Before this time the newspapers gave scant notice to anything which concerned the medical profession. It was within these societies that the idea was born to let the public somewhat into our confidence in matters pertaining to medical practice and the health of the community. From this modest origin have grown the mighty organizations of the present day which seek to educate the public not only in curative medicine but latterly more especially in the prevention of disease. From now on physicians, regardless of the department of the healing art with which they concern themselves, will not only be stimulated to do their best but will be compelled to have a knowledge of the latest which science develops for the betterment of mankind.

During the past decade much thought has been given to the subject of preventive medicine. It may be appropriate to consider just where the specialist comes into this picture. In an indefinite sort of a way there have been two schools of thought, and we may add a third school if we take into account the attitude of the public. There are those who feel that the realm of preventive medicine should be dominated by the various classes of public health activities. In the beginning the predominance of opinion in the profession was that this class of public health workers should rightfully assume all the prerogatives for the prevention of disease. The reason for this attitude of mind was that we looked to these agencies for protection against widespread epidemics and faulty hygienic conditions existing extensively in local communities and throughout the country generally. We also looked to these agencies to prevent the introduction of maladies from foreign lands. There can be little question that these wider spheres of activity must continue to remain in the hands of the national and local public health organizations. The second school of thought, looking with clear vision to the future and recognizing, on the one hand, the limitations of service to the individual by public health organizations, and on the other, to the trend toward so-called state medicine, realized that the general practitioner should be the dominant factor in the field of preventive medicine. It is to this second school of thought that the majority of thinking physicians adhere at the present time. The public, however, cares little who directs preventive medicine activities so long as it is safeguarded from preventable disease and casualty. With this public attitude of mind we have more and more to concern ourselves. It is vitally necessary for us to come to understand this attitude of mind, and to so shape our course in the future as to gain entire confidence of the public. In this way and this way alone may we exert the greatest influence in staying the progress toward government control of the practice of the healing art. The latter-day tendency of a large proportion of recent graduates from our medical schools to take up one or other of the specialties immediately upon graduation is creating a dearth of general practitioners. This tendency has been the subject of much discussion within the profession, and now is commanding the attention of lay writers.

As to the relation between the practice of a specialty and preventive medicine, once again we may turn to the practice of ophthalmology for illustration. From 1890 to, say 1920, there was an alarming increase in impaired vision in all ages and conditions of society. The ophthalmologists very promptly recognized that their whole duty did not end with the correction of the eyesight of the individual, but taking a wider view of the subject they began at once to study the underlying cause for this widespread impairment of vision. Right at this point the ophthalmologist entered the field of preventive medicine by seeking to discover and correct the underlying causes for the development of the malady. This illustration quite clearly points to the necessity for the specialist to study and seek to understand and prevent these destructive forces which lead to the development of the diseases which lie in his field of activity.

Our duty to the public does not end with our knowledge of these facts, nor even with our application of this knowledge to individual cases. A far greater and more sacred obligation rests with the practitioner of medicine regardless of his field of activity, and one which we have been very tardy in recognizing. It is incumbent upon us to disseminate proved facts relative to the basic causes for the development of disease. Under a misapprehension that it is both undignified and unwarranted for the profession to take the public wholly into our confidence we have too long hesitated to instruct the public through the medium of the press, the platform and the radio broadcast. A powerful deterrent influence to those who are in a position to give sound intelligent and constructive instruction by these methods has been and still is their reluctance to subject themselves to the criticism of those members of the profession who are either indifferent to the value of public teaching or are incapable or unwilling to enter this field of public service. However, herein lies a sacred duty to all mankind which we cannot longer shun.

Some writers go to the extreme of contending that there is no just reason for the existence of any specialty in medicine. Such an assertion, on the face of it, shows an unsound and contracted view of this economic problem. Present day efficiency requires such infinite knowledge of detail in the professions, in industry and in commerce that it is impossible for any one person to be sufficiently versed in all the phases of any one line of endeavor; hence the evolution of the specialist. This obtains in all professions and in business of every description. Why then should the medical profession be called upon to take a backward step in the conduct of its affairs? No physician, however highly endowed in an intellectual way, could acquire the knowledge and the proficiency to enable him to do justice in all of the fields of medical practice. Many of the greatest discoveries in medicine and surgery have been brought to light by those who have devoted years of thought and study to one particular branch or specialty of medicine. These discoveries have resulted in the prodigious progress which our profession has made during the last fifty years. As a proof of this assertion one has only to remember the work of such great specialists as Lister, Pasteur, Koch, Baynham, Laveran, Widal, Wassermann, Ehrlich, Welch, Walter Reed, Einhorn, and others too numerous to mention. Without the untiring devotion of these men to their chosen fields of activity the present day progress of medicine would have been impossible. Is it not fair to assume that we must look to those physicians who will devote their energies to limited fields of research for still greater development in the science and art of medicine in the future? We all fully realize that a thoroughly equipped, highly scientific, yet clinically sound family physician is vitally necessary, and should form the bulwark in the daily practice of medicine. Indeed, it appears to me that we should develop yet another specialty, that of the family physician.

Turning now to the specific consideration of the necessary course to be followed by those who contemplate limiting their field of activity to a specialty, some arguments for and against such a course may be presented. The field of medicine has become so wide, and the progress in its development is so rapid, that it is impossible during the span of a lifetime for a single individual to master it sufficiently to become highly skilled in all of its departments; and now that the public is acquiring a constantly increasing knowledge and understanding of that which they have a right to demand from the practicing physician, it is no longer content with service based upon practices which were in vogue a few years back. The public is quick to recognize obsolete methods. Hence, of its own volition it turns to those clinicians of recognized skill in the field of practice into which particular maladies fall. This fact alone answers the criticism which formerly was aimed at the development of specialism in medicine.

The most forceful argument in favor of entering a special field in the practice of medicine is that it enables the clinician to focus the major part of this thought, time and study on a limited sphere of activity and by so doing to acquire greater knowledge of such diseases, their cause, development and cure as affect this particular specialty. Not only is he able but forced to keep well abreast of the developments and progress in that department of medicine. One of the serious dangers in the practice of a specialty, however, is that devotion to the limited field may lead the specialist to ignore achievements in the general field of medical practice. This results in a contracted horizon and a distorted conception of the importance of his specialty. Furthermore, such a man rarely ever attains to that broad culture which the public and the profession have come to expect of those engaged in specialized practice.

One of the dominant influences today in shaping the trend of medical education is the Association of American Medical Colleges. It may be of interest to recall that the Georgetown University Medical Faculty and the George Washington University Medical Faculty were influential in bringing this worthwhile organization into being in 1891. At the meeting of this Association held in New Orleans in November, 1931, the Committee on Educational Policies presented a report upon its study of the preparation of the student for the practice of specialties. That Committee recommended as basic fundamental requirements for preparation for special practice the following:

1. Graduation from a recognized medical college.
2. One year internship which should involve general clinical work. This should preferably be a rotating internship or one in which general treatment is stressed.
3. Residency, which might be in a broad special department, such as medicine, surgery, gynecology and obstetrics. This residency might consist of an assistantship in preclinical departments such as pathology, physiology, etc. In lieu of the residency, the requirement might be three years' experience under supervision, or five years' general practice.
4. Not less than two years of graduate clinical work under supervision of a university. The candidate in addition should be required to take sufficient training to attain a superior knowledge in the fundamentals which underlie diagnosis and treatment in his clinical field. The departments with which he has worked shall certify that in their opinion the candidate is competent to begin the practice of this specialty in a scientific manner without supervision. The candidate may then present himself for an adequate examination by the university.

   The candidate should receive adequate recognition of his attainments from his university.

As would be expected from such a group of investigators, these guiding rules for preparation for the practice of the specialties are comprehensive and sound. This report confines itself exclusively, however, to the professional preparation, giving no thought to that broad cultural training to which allusion has been made, as a necessary requisite for the specialist of the future.

A period of experience gained in general practice is invaluable to the specialist. More and more, specialists are coming to realize the interdependence of different organs. One cannot successfully treat diseases of a special character without taking into consideration all of the other functions and organs of the body. Hence it becomes a necessity to have a profound knowledge of the whole organism and of the pathological conditions which may develop in one part of the body or another. Quite as important is a thorough understanding of the functional disorders which may beset the individual. These things can be acquired only by experience in general practice. It would undoubtedly be a blessing if the law required such comprehensive preparation as has been outlined for specialization in medical fields. In the last analysis it is the man thoroughly trained, of strict integrity, sterling character and broad sympathies who will render the highest service and achieve recognition from his fellows and from the world at large.

W. G. M.

PROGRAM, SOCIETY ACTIVITIES

The Program Committee announces the following program for October and November:

October 12: George Washington Bicentennial Celebration.

October 19:

1. Dr. Wm. P. Herbst: "The Present Status of Renal Sympathectomy."
2. Dr. Earl B. McKinley: "The Etiology of Leprosy."

October 26: Program under the auspices of the Section on Pathology and Laboratory Medicine, Garfield Hospital Group.

1. Dr. J. F. Hunt: "The Technic of Continuous Intravenous Injection in Children."
2. Dr. E. Clarence Rice: "Malignant Tumors in Children: Report of Three Cases."
3. Dr. M. A. Selinger: "Congenital Anomaly of the Genitourinary Tract: Report of a Case."
4. Dr. Janvier W. Lindsay: "The Aschheim-Zondek Test in Teratomas."

November 9: Symposium on Blood Transfusions and other Intravenous Infusions.

1. Lieut. Col. S. N. Marietta, Walter Reed General Hospital: "The Value and Indications of Intravenous Injections in Internal Medicine."
2. Dr. Robert A. Bier: "The Value and Indications of Intravenous Injections in Pediatrics."
3. Dr. John H. Lyons: "The Value and Indications of Intravenous Injections in Surgery."
4. Dr. Maurice A. Selinger: "The Technic of Intravenous Therapy."

November 16: Program under the auspices of the Section on Internal Medicine. Dr. Henry Jackson, Jr., Boston: "Agranulocytic Angina and Allied Conditions."

November 30: Symposium on Headaches.

1. Dr. Antoine Schneider: "Headaches from the Standpoint of the Neurologist."
2. Dr. John Minor: "Headaches from the Standpoint of the Internist."
3. Dr. Samuel A. Alexander: "Headaches from the Standpoint of the Rhinologist."

ACTIVITIES OF SECTIONS

Section on Neoplastic Diseases, Eugene R. Whitmore, Chairman, holds monthly meetings on the third Saturday at 1 P.M. On October 15 a meeting was held at Georgetown University Hospital, the program being furnished by the Georgetown University Hospital Staff. It should be noted that there are no dues entailed in belonging to the Section on Neoplastic Diseases. All members are cordially invited to make application for membership.

Section on Pathology and Laboratory Medicine, Eugene R. Whitmore, Chairman, will meet every other month on the second Friday evening. On October 14 a meeting was held in the Conference Room of the Gallinger Municipal Hospital. The Gallinger Hospital Staff furnished the program. The chief subject for discussion was "Hematology."

Section on Nervous and Mental Diseases, D. Percy Hickling, Chairman, meets on the first Thursday of the month, in the Medical Society Building. On October 6, the following program was presented at a well attended meeting:

1. Afferent Conduction in the Spinal Cord, With a Note on the Flexion Reflex. Chester E. Leese, Ph.D., Department of Physiology, George Washington University Medical School.
2. Hypochondriasis; Report of Case With Recovery. Roger S. Cohen, M.D., St. Elizabeth's Hospital.

CHEMO-MEDICAL STUDIES OF PATHOLOGICAL CONDITIONS

(*Continued from page 269*)

Benedict, S. R., Newton, E. B., Behre, J. A., and Davis, A. R.: A New Sulfur-Containing Compound, Thiasine, in the Blood. J. Biol. Chem., 1926, **67**, 267.

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Hunter, G., and Eagles, B. A.: The Isolation from Blood of a Hitherto Unknown Substance and Its Bearing on Present Methods for the Estimation of Uric Acid. J. Biol. Chem., 1925, **65**, 623.

Hunter, G., and Eagles, B. A.: Non-Protein Sulphur Compounds of Blood. I. Sympectothion. J. Biol. Chem., 1927, **72**, 123.

Newton, E. B., Benedict, S. R., and Dakin, H. D.: Chemical Constitution of Thiasine. Science, 1926, **64**, 602.

Oriel, G. H., and Barber, H. W.: A Proteose in the Urine Excreted in Anaphylactic and Allergic Conditions. Lancet, 1930, **2**, 231.

Rupp, E., and Schied, A.: Ueber die Iodometrie des Rhodanwasserstoffe. Ber. d. deutsch. chem. Gesellsch., 1902, **35**, 2191.

Saxl, P.: Uber die Störungen im Eiweissstoffwechsel Krebskranker. (Zugleich ein Beitrag zur Kenntnis der Rhodanausscheidung.) Biochem. Ztschr., 1913, **55**, 224.

Sullivan, M. X.: A Distinctive Test for Cysteine. Pub. Health Rep., 1926, **41**, 1030. (Reprint No. 1084.)

Sullivan, M. X.: Studies on Biochemistry of Sulphur. IV. The Colorimetric Estimation of Cystine in Casein by Means of the Betanaphthoquinone Reaction. Pub. Health Rep., 1929, Supp. No. 78.

Sullivan, M. X., and Hess, W. C.: Studies on the Biochemistry of Sulphur. X. The Cystine Content of Meat and Fish. Pub. Health Rep., 1931, Supp. No. 94.

Tanret, C.: Sur une base nouvelle retirée du seigle ergoté, l'ergothionéine. Compt. rend. Acad. d. sc., 1909, **149**, 222.

Thiel, A.: Zur Iodometrie des Rhodanwasserstoffe. Ber. d. deutsch. chem. Gesellsch., 1902, **35**, 2766.

WASHINGTON'S MEDICAL CALENDAR

First Monday:

Georgetown University Hospital Staff
Bosworth Study Club (Dental)

Second Monday:

George Washington University Hospital Staff

Third Monday:

George Martin Kober Medical Society
Osler Society

Fourth Monday:

Washington Medical and Surgical Society

First Tuesday:

Clinical Club of Washington
Clinico-Pathological Society
Woman's Medical Society
Washington Dental Dinner
Capital Clinical Club (Dental)

Second Tuesday:

Sibley Hospital Medical Council
Mackall Society
District Dental Society
Children's Hospital Staff (Noon)

Third Tuesday:

Columbia Hospital Staff
Georgetown Clinical Society
Clinico-Pathological Society

Fourth Tuesday:

Homeopathic Hospital Staff (Noon)
District Dental Society

First Wednesday:

Medical Society of the District of Columbia (Business Meeting)
Faculty Seminar, George Washington University Medical School (Noon)

Second Wednesday:

Medical Society of the District of Columbia (Scientific Meeting)

Third Wednesday:

Medical Society of the District of Columbia (Scientific Meeting)
Garfield Hospital Staff (Morning)

Fourth Wednesday:

Medical Society of the District of Columbia (Scientific Meeting)

First Thursday:

Hippocrates-Galen Society
Section on Nervous and Mental Diseases, Medical Society of the District of Columbia

Second Thursday:

Medical Arts Society
Emergency Hospital Staff
Gallinger Hospital Staff (Morning)
Washington Dental Study Club

Third Thursday:

Providence Hospital Staff
Baltimore and Washington Dermatological Society
Jacobi Medical Society

Fourth Thursday:

Georgetown Medical Alumni Society

Second Friday:

Section on Pathology and Laboratory Medicine of the Medical Society of the District of Columbia (Every other Month)

Third Friday:

Section on Ophthalmology and Oto-Laryngology, Medical Society of the District of Columbia

Fourth Friday:

Section on Internal Medicine, Medical Society of the District of Columbia
Medical Review Club

First Saturday:

Washington Society of Pathologists

Third Saturday:

George Washington University Medical Society
Section on Neoplastic Diseases (1 P.M.)

WOMAN'S AUXILIARY TO THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

At a meeting on Wednesday, October 5, the following committee chairmen appointments were announced:

House: Mrs. Leroy L. Sawyer, Jr.
Membership: Mrs. Lester Neuman
Social: Mrs. Eugene R. Whitmore
Red Cross: Mrs. Prentiss Willson
Motor Corps: Mrs. E. L. Morrison
Publicity: Mrs. Robert Young Sullivan
Hygeia: Mrs. C. W. Culver
Ways and Means: Mrs. J. Lawn Thompson
Finance: Mrs. Arthur C. Christie
Mrs. A. L. Riddick
Mrs. Benjamin F. Weems
Program: Mrs. Lewis J. Battle

This constituted the first business meeting of the fall. A delicious luncheon was served. The following is the officer personnel:

President: Mrs. Harry Atwood Fowler
1st Vice President: Mrs. T. C. Thompson
2nd Vice President: Mrs. W. Earl Clark
Treasurer: Mrs. James A. Flynn
Recording Secretary: Mrs. Walter Freeman, Jr.
Corresponding Secretary: Mrs. Guy W. Leadbetter
Historian: Mrs. A. Barnes Hooe

AMERICAN PUBLIC HEALTH ASSOCIATION, SIXTY-FIRST ANNUAL MEETING

October 24–27, 1932

Under the leadership of Dr. Wm. C. Fowler, Chairman of the Local Committee on Arrangements, preparations have been completed for the entertainment of numerous visiting members of the Association. There will be many scientific papers read which will be of considerable interest to the local profession, also social entertainment afforded. The Willard Hotel will house most of the sessions; a few will be held in the Washington Hotel. Notable on the extensive program that has been arranged are the following papers:

Monday, October 24, 2:30 P.M. (*Fairfax Room, Willard Hotel*)

A Test for Reaction-Producing Substances in Concentrated Antipneumococcic Serum. L. A. Barnes, Ph.D., Antitoxin and Vaccine Laboratory, State Department of Public Health, Boston.

An Experimental and Clinical Comparison Between Convalescent Serum and Non-Convalescent Serum in Poliomyelitis. Maurice Brodie, M.D., Department of Bacteriology, McGill University, Montreal.

Tuesday, October 25, 9:30 A.M. (*Fairfax Room*)

The Laboratory Diagnosis of Typhus Fever and Spotted Fever. L. F. Badger, M.D., National Institute of Health, Washington, D. C.

Laboratory Diagnosis of Relapsing Fever and of Rat Bite Fever. Edward Francis, M.D., National Institute of Health, Washington, D. C.

Laboratory Aids in the Diagnosis and Serum Therapy of Pneumococcus Pneumonia. Albert B. Sabin, M.D., Department of Bacteriology and Immunology, New York University and Bellevue Hospital Medical College.

Rheumatic Diseases and Sore Throat with Reference to Hemolytic Streptococci. I. Pilot, M.D., and D. J. Davis, M.D., College of Medicine, University of Illinois, Chicago.

(*T-Room, Washington Hotel*)

Standard Methods of Examining Powdered Milk and Its Allied Products. P. S. Prickett, Ph.D., Mead Johnson & Company, Evansville, Ind.

A Study of Bacteriological Methods of Testing and Means of Disinfecting Water with Chlorine, with Particular Reference to Swimming Pool Water. W. L. Mallmann, Department of Bacteriology, Michigan State College, East Lansing, Michigan, and William H. Cary, Jr., Department of Health, Detroit, Mich.

Tuesday, October 25, 2:30 P.M. (*Gridiron Room, Willard Hotel*)

Seasonal Distribution of Whooping Cough for Periods of High and Low Incidence. Gaius E. Harmon, M.D., Department of Hygiene and Bacteriology, School of Medicine, Western Reserve University, Cleveland, O.

(*Fairfax Room, Willard Hotel*)

A Study of 1300 Deaths from Measles. E. S. Godfrey, Jr., M.D., Director, Division of Communicable Diseases, State Department of Health, Albany, N. Y.

Epidemic Influenza: A Comparison of Symptomatology as Observed in a Major and in a Minor Epidemic. J. A. Doull, M.D., and Anna Bahlke, Department of Hygiene and Bacteriology, Western Reserve University, Cleveland, O.

The Risk of Persons in Familial Contact with Pulmonary Tuberculosis. W. H. Frost, M.D., School of Hygiene and Public Health, Johns Hopkins University, Baltimore.

(*Large Ball Room, Willard Hotel*)

Mental Health of the Adolescent. William A. White, M.D., President, Institute of Mental Hygiene, Washington, D. C.

Wednesday, October 26, 9:30 A.M. (*Fairfax Room, Willard Hotel*)

The Clinical Value of the Presumptive Kahn Test. Tomas Cajigas, M.D., Clinical Pathological Laboratory, Washington, D. C.

Some Observations on the Quantitative Kahn in the Various Stages of Syphilis. John M. McCants, M.D., Lieut. Comdr., M.C., U. S. N., Norfolk Navy Hospital, Portsmouth, Va.

The Agglutination Reaction in the Identification of Certain Pathogenic Funguses. W. D. Stovall, M.D., and Anna Bubolz, State Laboratory of Hygiene, Madison, Wisc.

(*Large Ball Room, Willard Hotel*)

Hemolytic Streptococcus Antigens from Throats of Normal People Compared With Those from Beginning Pneumonias and Terminal Septicemias. Anna W. Williams, M.D., C. T. Gurley, B. Kulchin and N. Stryon, Bureau of Laboratories, Department of Health, New York City.

Carriers in Whooping Cough. Travis P. Burroughs, M.D., Director, Bureau of Communicable Diseases, and Edmund K. Kline, D.P.H., Director of Laboratories, Cattaraugus County Department of Health, Olean, N. Y.

Demonstration of Tubercle Bacilli in the Sputum, Feces, and Stomach Lavage of Suspected Tuberculous Children. Lucy Mishulow, Bureau of Laboratories, Department of Health; Camille Kereszturi, M.D., New York University Medical College, and David Hauptman, M.D., Department of Pediatrics, Sea View Hospital, New York City.

(*Small Ball Room, Willard Hotel*)

Health in the Philippines. M. A. DeLaney, M.D., Brigadier General, Medical Department, Assistant Surgeon General, War Department, Washington, D. C.

Wednesday, October 26, 12:15 P.M. (*Small Ball Room, Willard Hotel*)

Toxoid Versus Toxin-Antitoxin. William H. Park, M.D., Bureau of Laboratories, Department of Health, New York City.

Thursday, October 27, 9:30 A.M. (*Gridiron Room, Willard Hotel*)

The Dissocation of Bacterium Typhosus in Its Relation to the Production of Anti-typhoid Vaccine. Francis B. Grinnell, M.D., Department of Bacteriology and Immunology, Harvard University Medical School, Boston.

Study of Variation in Erysipelas Strains. Sophie Spicer, M.D., Bureau of Laboratories, Department of Health, New York City.

(*T-Room, Washington Hotel*)

The Effect of Tonsillectomy on the Schick Test and Dick Test. William H. Park, M.D., Bureau of Laboratories, Department of Health; Camille Kereszturi, M.D., New York University Medical College, and Oscar Rimson, M.D., Fifth Avenue Hospital, New York City.

The Use of Concentrated Toxoid in Immunization Against Diphtheria. William Edward Bunney, Ph.D., Bureau of Laboratories, State Department of Health, Lansing, Mich.

(*Fairfax Room, Willard Hotel*)

The Application of the Principles of Water Purification to Swimming Pool Control Programs. A. H. Fletcher, Sanitary Engineer, Department of Health, Memphis, Tenn., and A. E. Clark, Associate Sanitary Engineer, State Department of Health, Nashville, Tenn.

A complete program may be obtained at the "Willard" on October 24.

The presentation of papers will be before sectional groups of which Industrial Hygiene, Child Hygiene, Public Health Education, Vital Statistics, Laboratory, Epidemiology, Public Health Engineering, and Public Health Nursing Sections are representative.

There will follow a meeting of allied organizations, such as, American Association of School Physicians, International Society of Medical Health Officers, Conference of State Sanitary Engineers, State Laboratory Directors' Conference, Association of Women in Public Health, American Social Hygiene Association, National Shell Fisheries Association and Oyster Growers and Dealers Association of North America, Inc.

A program of entertainment will include on **Monday, October 24,** beginning at 10 A.M., an inspection of the National Institute of Health, and Naval Hospital. Approximate time for the trip will be 2 hours. A visit will be made in the afternoon to the Municipal Sewage Disposal Plant. At 8 P.M., the first general session, with an invocation by the Right Reverend James E. Freeman, Bishop of Washington. Addresses will follow by Dr. Wm. C. Fowler, Health Officer of the District of Columbia, Hugh S. Cumming, Surgeon General, U.S.P.H.S., and the Honorable Luther H. Reichelderfer, M.D., President, Board of Commissioners of the District of Columbia. There will also be an address by the President of the American Public Health Association, Louis I. Dublin, Ph.D.; later, reception and dancing.

Tuesday will include visits to the Bureau of Census, Army Medical Center. The Corcoran Gallery of Art, through the courtesy of the Board of Trustees, will remain open on that date until 5 P.M.

Wednesday, October 26, the President of the United States will meet members and their wives at the White House. At 2 P.M. there will be a complimentary sight-seeing trip for the guests. 8 P.M., banquet followed by dancing.

Thursday, October 27, there is scheduled a visit to Dalecarlia Water Filtration Plant.

The members of the Medical Society of the District of Columbia are especially urged to lend all support possible to Dr. Fowler and his committees, in extending to the delegates a warm welcome. There will be a registration desk at the Willard Hotel where further information may be gained concerning the meetings.

Personnel of Local Committees:

General Chairman, Wm. C. Fowler, M.D., Health Officer, District of Columbia.
General Vice Chairman, Edw. J. Schwartz, M.D., Assistant Health Officer, D. C.
General Secretary, L. R. Thompson, M.D., Assistant Surgeon General, U.S.P.H.S.

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Registration and Information

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Dr. A. E. Russell
Dr. Bolivar J. Lloyd
Dr. M. C. Guthrie
Miss Elizabeth Tandy
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Comdr. E. H. Tennet
Miss Dorothy F. Thompson

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JOINT MEETING, SOCIAL HYGIENE SOCIETY OF THE DISTRICT OF COLUMBIA AND THE MEDICAL SOCIETY OF THE DISTRICT OF COLUMBIA

1718 M Street

October 27, 1932, 8 P.M.

Dr. H. A. Fowler, President, will preside on this occasion. Dr. William F. Snow, of New York City, General Director, American Social Hygiene Association, will introduce the speaker, Dr. Edward L. Keyes, of New York City, President of the American Social Hygiene Association, whose subject will be, "The Present Status of Venereal Prophylaxis."

It should be remarked that authorization was given the President to appoint a Liaison Committee with the Social Hygiene Society of the District of Columbia. Dr. Walter R. Stokes is chairman of the committee; Drs. H. Gladys Kain and H. J. Russell McNitt, members. Through its activities, and with the approval of the Medical Society at its meeting held Wednesday, October 5, a joint meeting was arranged.

The Regional Social Hygiene Conference meets on Thursday, Friday and Saturday, October 27–29, inclusive, and will include papers of interest. Dr. William A. White will preside at the luncheon session on Thursday. He will read a paper, "The Philosophy of Sex," at the dinner session to be held at 6:30 P.M. on Friday. A symposium on "Sex Education" concludes the general session on Saturday. A symposium on "Syphilis as an Industrial Problem" will be presented at a joint session with the American Public Health Association on Thursday, October 27, 9:30 A.M. J. R. Garner, M.D., Chief Surgeon, Atlanta and West Point Railroad Company; C. H. Kibbey, M.D., Director of Sanitation, Tennessee Coal, Iron and Railroad Company; and Dr. Walter Clarke, Director, Division of Medical Measures, American Social Hygiene Association, read papers. Mr. Paul Benjamin, Secretary, 927 Fifteenth Street, N. W., will gladly furnish members with any further details concerning meetings.

FACULTY SEMINAR

The Faculty of the School of Medicine of George Washington University has inaugurated a program of monthly seminars and noon luncheons to be held at the University Club on the first Wednesday of each month throughout the academic year. The first Faculty Seminar was held on Wednesday, October 5, at which nearly one hundred members of the faculty attended. The speakers at these seminars present only work of original investigatoins and time is allowed for a general discussion. Dean Earl B. McKinley gave a paper at this first meeting on, "A Concept of Susceptibility and Resistance to Infectious Diseases on a Physiological Basis." Dr. William A. White will speak at the Faculty Seminar in November.

LABORATORY OF NEUROLOGY

George Washington University has established a laboratory of neurology for the investigation particularly of tumors of the brain and of virus diseases affecting the central nervous system. Surgeons and pathologists desiring special reports on their specimens are invited to call the technician in charge so that the material may be fixed by special methods immediately after removal.

INSTRUCTIONS FOR THE LAYMAN

In the September issue of *The American Rifleman*, Dr. J. Lawn Thompson has an instructive article, "First Aid for the Sportsman." A perusal demonstrates the doctor's familiarity with the physical problems that one who follows the trails in the woods might be called upon to solve.

DAVIDSON LECTURE, 1933

According to the provisions of the Davidson Lecture Foundation, the next lecture will be given in 1933. A subcommittee of the Executive Committee has been appointed with a view to the selection of prospective candidates for giving this lecture. It will be recalled that the sum of $300.00 is available as an honorarium to the lecturer. Personnel of the Committee is as follows: Arthur C. Christie, Joseph S. Wall and William H. Hough. Suggestions or proposals of names will be welcomed.

MEDICAL DEFENSE

The Medical Defense Committee of the Society is constantly being confronted with claims filed against members who do not appear to have necessary insurance protection. It may be said that premium rates have been increased and that State Journal of other constituent bodies of the American Medical Association seem to indicate that the maintenance of adequate medical defense is still a growing problem. A note of optimism appears in the local committee's succeeding frequently in preventing the actual filing of suits through prompt action by attorney. All members of the Society are advised to be insured against the frequently unfounded claims for alleged malpractice. Advantages of group insurance are available to members. Make prompt report to the Society's Office of any threats of suit. The Committee: Sterling Ruffin, Chairman, Francis R. Hagner, John B. Nichols, and C. B. Conklin, ex officio.

JOHN OSCAR SKINNER, M.D.

1845–1932

We regret to announce the death of Dr. John Oscar Skinner, born May 4, 1845. Dr. Skinner was graduated in medicine in 1866, becoming a member of the Medical Society of the District of Columbia on April 5, 1911.

PRESENT-DAY TRENDS OF PRIVATE PRACTICE IN THE UNITED STATES—

Morris Fishbein, M.D.

"The family physician will always be the most economic and practically the most satisfactory physician for ninety per cent of human ailments. The remaining ten per cent of human ailments require hospitalization and specialization. Modification of the curriculum or abbreviation will not lead to a greater number of general practitioners. The rewards of general practice must be made attractive in comparison with the rewards of specialization. The general practitioner must become increasingly a practitioner of preventive medicine, and people must learn that preventive medicine is, like curative medicine, to be paid for, particularly because it is always worth more than it costs."—Extract from *The Diplomate*, September, 1932.

MEDICAL ANNALS
of the
DISTRICT OF COLUMBIA

VOLUME I NOVEMBER, 1932 NUMBER 11

AN APPRAISAL OF THE CHARACTER OF GEORGE WASHINGTON*

JOHN BENJAMIN NICHOLS, M.D.
Washington, D. C.

It is the happy privilege of American citizens to take the occasion of his bicentennial birth anniversary to render tribute of honor to George Washington. Physicians share with other Americans in the memories of that great patriot and in the heritage of liberties and institutions which have come through his struggles and travail. They participate alike in the sentiments which the occasion inspires, and may well digress for a moment from their special preoccupations to add their patriotic testimonials. In doing so, there are lines pertinent to the profession along which the subject can be pursued with special fitness, such as the physical and psychologic aspects of Washington's own life, and his personal relations with medical men.

It is especially appropriate that the Medical Society of the District of Columbia should render tribute to his memory and worth. It is located near the scenes of his home life and activities, and in the national capital which he founded and which bears his name. The Society also has a link of personal connection with George Washington, due to the fact that its premier member (in priority of birth), Dr. Elisha Cullen Dick of Alexandria, was a friend and associate of Washington and one of the physicians who attended him in his final illness.

The particular theme which I wish to present on this occasion is an appreciation of George Washington as reached through a consideration of the traits of his personality and character. I can make no claim to proficiency in psychologic and personality analysis, and there are other members of this Society much better qualified than I to make such a study; it is, therefore, with diffidence that I venture to present any observations in this field. Yet it is a line of thought that has attracted me and led me to some conception of Washington's characteristics and the elements of his greatness.

The conventional conception of Washington, as portrayed by past historians, has been that of a frigid superman, a stilted paragon, with a soul always keyed up to exalted heights and never descending to the lighter things of life. If Washington had really been such a man, he would have been an insufferable prig, quite unattractive and uninspiring. Latterly biographers have studied his life more candidly by the factual and documented methods of rational historical research, eliminating myth and fiction, and presenting him as the real human being that he was. There was nothing in Washington's life that can detract from his greatness and achievements. It was a real live man, whom we can understandingly appraise, who played that great part in history; not a lifeless image of stone, edited and sentimentalized out of all semblance to humanity. His qualities were not all superlative, and some were mediocre; but if he had imperfections and weaknesses, his glory is all the greater because he accomplished so much in spite of them.

On the other hand, it is not necessary, nor is it seemly, to study Washington's life in a carping, belittling, or malicious spirit, as exhibited by some of the biographers. There is no call to emphasize his foibles and weaknesses uncharitably or disrespectfully, nor to make labored effort to draw his frailties from their dread abode. Not that Washington's private life can not withstand searching scrutiny as can that of few men; but our national heroes are entitled to the same courtesy and kindly regard and respect that we render to our personal friends.

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* Read before the Society, October 12, 1932.

A psychologic appraisal of Washington's characteristics should, then, follow a dispassionate median course, avoiding exaggerated eulogy and unrestrained adulation on the one hand, and hypercritical cynicism and flippant iconoclasm on the other, in a decent temper of propriety and respect. Some of Washington's traits are very obvious; others are more baffling and could be deciphered, if at all, only by the keenest masters of personality analysis.

Idealization of Washington was practiced by the protrait painters as well as by his biographers. So individualistic was their idealization that the portraits of Washington by different artists are scarcely recognizable as the same individual. Houdon's statue, based on actual life casts, may naturally be regarded as the truest to life. The Williams portrait of Washington, in Alexandria, was intended to be, and was regarded as, a true likeness; and, since the painting even shows the smallpox scars and other defects on the face, the artist may be presumed to have at least attempted to make it lifelike. From its physical verisimilitude this "debunked" and unflattering portrait should especially interest physicians; and for interpretation of the baffling and very human expression of the face as depicted by the painter may be commended to the attention of students of Washington's personality.

Washington's voluminous diaries and correspondence and the intimate records of his life and activities disclose to us the real flesh and blood man that he was.

His schooling was very deficient, as shown by his atrocious spelling. He made his first entry into public service at a precociously early age, and even in his youth he displayed in striking degree the characteristics that were prominent in later life. He was an official salaried public surveyor at the age of seventeen years, and he had a military commission, with a salary and the rank of major, before he was twenty-one. At twenty-two he was charged with the command of a military expedition, and though defeated he struck a spark that started a veritable world war. Too much has been made of this defeat by unsympathetic biographers. Some allowance is due on account of the immaturity and inexperience of a boy of that age. If in his first real battle, outnumbered three to one and after a gallant defense, he met defeat, Braddock in the same region, with great experience and prestige and with a formidable and well organized force, was far worse overwhelmed by a much inferior enemy, a disaster which was duplicated three years later in the same field in the massacre of Grant's command at Fort Duquesne. By comparison the score was vastly in Washington's favor.

Much has been made of Washington's youthful love affairs, more perhaps than they really warrant. There was nothing unusual or remarkable about them. In this respect nature took its regular course; and if in his youthful days, at least, he displayed a certain sentimentality, what boy should not? At the dawn of this period of his life, Lord Fairfax, a lifelong bachelor, wrote of him thus ungallantly to Washington's mother: "He is, I suspect, beginning to feel the sap rising, being in the spring of life, and is getting ready to be the prey of your sex, wherefore may the Lord help him and deliver him from the net those spiders, called women, will cast for his ruin." After all, Washington's marriage was canny; and if his wife brought him a large and appreciated fortune, she for her part frankly admitted her need of a manager for her extensive estates and affairs. Because there was some substantial basis of intelligence, their married and domestic life was lastingly felicitous and serene to a rare degree.

In the conduct of his personal and business affairs Washington was methodical, enterprising, shrewd and exacting; he was a hard driver and pusher, and might be said to be hardheaded and what we would now call "hardboiled." In the pursuit of his purposes he was persevering and pertinacious to the point of obstinacy. That was his way of getting things done, in his public undertakings as well as his private affairs. He was one of the richest and most successful business men in the colonies; and his success in public service is a part of history.

He had a warmer and more social side. He liked to make a good appearance and favorable impression before people; witness the painstaking compilation of rules of deportment which he drew up as a boy of thirteen. He was fond of being well and fashionably clad, in the elaborate and colorful style which characterized men's dress in those days; his orders to his London agents show the meticulous attention which he gave to every detail of his apparel. He was a stickler for the respect and honors due him and his position. He was capable of outbursts of wrath; and yet on occasion he could show remarkable patience and meek self-restraint, and he did not permit his personal feelings under provocation to interfere with his public service. In his diaries he chose to record only the commonplace minutiae of his daily life and domestic affairs, to the entire neglect of the great public events then transpiring and in which he was participating. He engaged with zest in all the enjoyments and pleasures of his time; and he was by no means the puritan depicted by some of his sanctimonious biographers. His personal benefactions, not publicized, were many and generous, and betokened a warm heart beneath his grave exterior.

Washington's mind worked slowly in thought and in arriving at conclusions; but with time to think them out his final judgments were correct and true. In an emergency, as in the haste and heat of battle, his decisions might be faulty. But though slow and not quick-witted, he was sure; and he inspired his fellows and associates with trust and confidence in his judgment and ability.

On account of his slowness and unreadiness of thought he was a poor conversationalist and utterly lacking in ability for public speaking. In consequence he displayed a certain bashfulness and shyness, to which was doubtless to some extent due his appearance of reserve and gravity. On account of his slowness of thought and speech flippant critics have insinuated that his abilities are over-estimated. But *virtue, non verbis*; it is merit that counts, and not talk. Washington may have been mute, but he was not dumb; and if he was not vocal, he was amazingly graphic. Behind his silent exterior there was a hot spirit and an active and powerful mind, which was displayed in the astounding torrent of letters in which he poured out his soul and his thoughts, in the elaborate and stately (even if somewhat sentimental and grandiose) epistolary style of that time. A contemporary diarist observing the Virginia Assembly in 1774 noted that Washington was "too bashful and timid for an orator;" "he is . . . . a poor speaker . . . . but shines in the epistolary way." The total number of letters written by him is variously estimated at from twenty-six to forty thousand; which with his voluminous diaries constitute an impressive literary production of notable range, style, and force.

Washington's military ability has been questioned because he suffered so many defeats in battle. It is idle, however, to speculate on what might have been the outcome of the War for Independence if the British commanders had not been so amazingly slothful and inefficient, or if the aid of the French had not been brought in, or if Washington had been opposed by, say, a Lee or a Jackson. The great fact remains that even if Washington lost many battles he won the war. It is in precisely that fact that lies Washington's greatness—he lost his battles, but he won the war. Of what other great leader can the same be said? In spite of repeated defeat and disaster, in spite of the most appalling hardships and difficulties, in spite of the failure of resources and the fading of hope, in spite of war-weariness and exhaustion of the country, as the years dragged wearily and drearily along, the soul-tried Washington managed somehow to keep his attenuated army in being, to prevent a complete breakdown of the morale of the people, and to keep the embers of the Revolution smouldering. We know of no other who could have carried the burden and endured the strain; without Washington the cause would have been lost. With indomitable will, infinite patience and unfaltering energy he struggled and endured; and he was the one indispensable factor in the final success.

What were the traits of character which endowed Washington with the force and ability for this mighty struggle and endurance? Was he inspired by a compelling sense of public duty, a supreme altruism? Was he activated by an innate kinetic drive, an insistent and masterful urge for doing things? Was he animated by egotism, or aristocratic pride, or haughty austerity? Was it because when once entered in the contest he was compelled to continue to the bitter end, since to have given up would have been at the cost of his fortune and his life? That was a contingency which he must have considered before he engaged in the great enterprise; and his personal courage was superb. Was there an element of vanity, a desire for glory and fame, a sensitiveness to criticism, a dread of the shame and disgrace of failure, which motivated and sustained him? Was it his diffidence or even an inferiority complex, in the effort to hide and suppress which he put forth and maintained before the world a rugged vigor and aggressiveness? We can go over the gamut of possible factors in his spiritual makeup, but—and perhaps it is beyond the possibility of convincing analysis—the precise mixture of the motives and springs of his actions, the composition of his personality, lie deeply imbedded in the profundity of his character. Whatever they were, the magnitude of Washington's achievement can not be lessened.

Washington was not only "first in war;" he was also "first in peace." War is so spectacular and dramatic that the less sensational but far greater achievements of peace are apt to lack proper appraisal. The American War was really no more than a war of independence or liberation; it was not until after its close that the real American Revolution was effected, or even much more than barely begun. In an address in 1787 our physician-patriot, Dr. Benjamin Rush, said: "There is nothing more common than to confound the terms of American Revolution with those of the late American War. The American War is over; but this is far from being the case with the American Revolution. On the contrary, nothing but the first act of the great drama is closed. It remains yet to establish and perfect our new forms of government; and to prepare the principles, morals, and manners of our citizens for these forms of government, after they are established and brought to perfection."

The liberated colonies were a loose aggregation of weak and self-seeking commonwealths, without solidarity or national spirit. The lamentable condition into which their affairs drifted filled the soul of Washington and other high-minded patriots with dismay, disgust, and almost despair; this wretched outcome had not been worth the cost of the war. Although Washington was a builder of a nation on a democratic basis, he had no illusions about the popular intelligence and spirit. The vaunted equality of men, which the demagogs were willing to exploit for their own purposes, he appraised realistically.

However, a group of patriots with lofty purposes and far vision effected a constitutional organization for the nation. There was powerful opposition, inspired and characterized by the usual selfish interests and petty-mindedness and the inevitable ineptitude, inanities, and asperities of politics; and it was only with the greatest effort and no little maneuvering that the adoption of the Constitution was finally effected. Washington's powerful influence and help were a potent force in aiding to bring about this result. The next great task was that of erecting the nation, in all its spiritual and physical elements, from the blue print of the paper constitution. This task was unanimously assigned to Washington; and it was under his able management and leadership, in the face of disheartening opposition and bitter partisan abuse, that the details of the new governmental machine were wisely organized and firmly established along lines that have continued ever since. After Washington the government was a going conern and an era of good feeling had been established, such that thereafter it could withstand lukewarmness and mediocrity, and later overcome a catastrophic dichotomy.

"First in war, first in peace." Without Washington the War of Liberation would not have been won; and without him perhaps the establishment of this great nation would not have been effected. Either achievement alone would have merited immortal glory; but the accomplishment of both was the supreme fulfilment of an unparalleled career.

These observations are perhaps foreign to the tone of a medical meeting; but the appreciative student of Washington's life can hardly refrain from expressing the compelling sense of admiration and inspiration that is aroused.

In what way can we pay the truest tribute to Washington?

When the Romans listened to Cicero, they said he was a great orator; but after the Greeks heard Demosthenes they were on fire to go out and fight the Persians. So we can honor Washington with the head, or with the heart. We can coldly appraise him as a great man; but that alone falls far short of the fullest tribute due him. If while rendering "lip service" to his memory we betray the immutable principles for which he contended, we dishonor him. We should catch his spirit, and with our hearts quickened and our souls enthused, be fired with energy and zeal to carry on our part of those social and civic activities that maintain and advance American Institutions and ideals. In the sublime sentiments of the "Second Great American," we can not honor nor ennoble Washington; he ennobled his own life far beyond our power to add or detract; and it is rather for us, the living, to dedicate and devote ourselves to the great cause which he left to us. Finality did not come to the American nation after Washington; evolution and revolution are continuous and demand our constant effort and devotion to progress and development. Difficulties, trials, and disasters still come to us, as they did to Washington; even now the entire world is in a Valley Forge of trouble and despair, and the security of the nation trembles in the balance. We need his unfaltering fortitude, his sagacity, his spirit to enable us to overcome the appalling difficulties that beset us. To that end it is as needful for us now, as it was to Washington and his compatriots, to pledge our lives, our fortunes, and our sacred honor; in that way and in that spirit we can render the truest and the sincerest honor to George Washington.

THE DIAGNOSIS OF PRIMARY TUMORS OF BONE BY MEANS OF THE ROENTGEN-RAY*

CLAUDE MOORE, M.D.
Washington, D. C.

The best single factor in the diagnosis of diseases of bone is a series of excellent roentgenograms. This fact is now known by radiologists, and it is being generally recognized by the better diagnosticians and surgeons. This fact has been impressed upon me by the study of 1108 primary tumors of bone, reviewed from the bone registry of the American College of Surgeons, the Mayo Clinic, and a few from my own practice. An attempt will be made to show you the value of roentgen-ray examinations as the first procedure in making a diagnosis of such a tumor.

There have been many classifications of osseous tumors, but the more simply they can be grouped, the more easily they are to understand. The two broadest divisions separate them into primary tumors, or those arising in the bone, and secondary tumors, or those that arise elsewhere in the body and metastasize to the skeleton. The latter are found in the last stages of malignant disease, and death can be expected in a short time. Primary tumors of bone are either benign or malignant, and in this latter type, an early diagnosis is absolutely essential if favorable results are to be secured be any type of treatment. The diagnosis must be made in the first few months and more preferably in the first few weeks. This is true with any cancer, but it is particularly true in cancers of bone, because these are all exceptionally malignant and metastasize early, and the prognosis in all cases is extremely poor. In over two thousand cases in the files of the American College of Surgeons, there are less than fifty cases in which the patients are alive five years after the onset of the disease. Cancers of bone are so malignant that many patients already have metastases in the lungs when they first seek medical aid. In a recent article, Ewing says, "The diagnosis of bone tumors is nearly always delayed until the disease has become established and the prognosis bad. I would urge that every case of persistent, unexplained pain in a bone be regarded, provisionally, as a sarcoma. Much harm is frequently done by a hasty resort to biopsy." Bloodgood also states, "Teach the medical profession and the public the protective value of making X-ray films after any injury to, or any symptom in or about a bone or joint."

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* Read at the Annual Meeting of the Society, May 4, 1932.

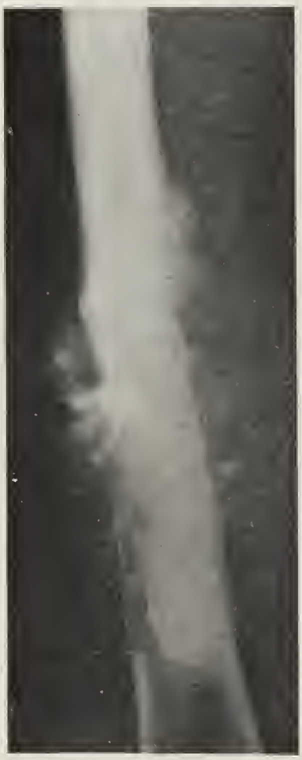

Fig. 1. Osteogenic Sarcoma of the Femur

The usual procedure in the average hospital after a diagnosis of an osseous tumor has been made, either with or without the aid of the roentgen-ray, is operation, either amputation or excision, depending on the location. If the tumor is a malignant one, the surgeon has most probably not cured the patient. If it was a benign tumor, amputation was not indicated, and the patient has been uselessly crippled for life. It is appalling the number of amputated extremities that reach the bone registry containing supposed osteogenic sarcomas that are found to be benign lesions, more particularly of the large giant-cell tumor type. In cases in which biopsy is done before or at the time of amputation, the diagnosis is often wrong even when made by a competent pathologist. The tissue will contain spicules of bone, and microscopic sections cannot be made by frozen section until after decalcification. The differential diagnosis of most benign and malignant

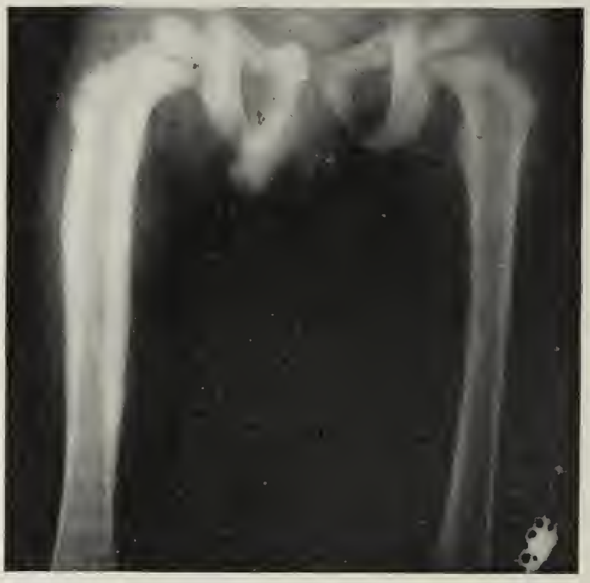

Fig. 2. Endothelial Myeloma (Ewing Tumor) of the Femur

tumors of bone is very difficult to make with the best prepared sections of tissue. Microscopic sections of rapidly growing osteochondroma are extremely difficult to differentiate from true osteogenic sarcoma. Many chondromas and myxochondromas are benign tumors at first, but rapidly become malignant, often due to partial removal and explorations. Due to inexperience these may be diagnosed as simple benign tumors at biopsy, and the patient may later lose his life from the growing malignant lesion. McCarty of the Mayo Clinic has stated that young, rapidly growing callous tissue about a fracture is often impossible to distinguish from osteogenic sarcoma. When the pathologist reports that the biopsy specimen shows normal or inflammatory tissue, the nature of bone tumors is such that there is considerable probability that the biopsy material was not taken from the lesion, and the tumor may be a cancer after all. When the size of an osteogenic tumor is such that it can be located and distinguished grossly, surgery will seldom save the patient's life. It is now known that the majority of cases of osteogenic sarcoma reported cured by amputation or other surgical procedures were not osseous cancers, but were simple benign tumors, most often of the giant-cell type. The surgeon has crippled his patient, instead of saving his life as was supposed.

The technic of roentgenography has been developed to such an extent that excellent detail of bone can be secured at every examination. In this short paper it will be impossible to describe the roentgenographic appearance of any variety of tumor of bone, and no description is ever so valuable as the study of the films. Roentgenograms show the extent of the trouble, and when studied by an expert they more often reveal the type of tumor than all other methods of examination. History, physical and other routine examinations, should not be neglected, but these more often confirm the opinion of the radiologist. Study of the blood is important, but a positive Wassermann test is not assurrance that the patient does not have an osteogenic sarcoma. There is no contraindication to simultaneous antiluetic treatment and radiotherapy. The diagnosis of the lesion may never be conclusive but a life may be saved by persistent combined treatment, particularly if a radiologist is of the opinion that the lesion may be malignant. Subsequent roentgenograms may settle the diagnosis. Weber has shown that cases of endothelial myeloma of bone (Ewing tumor) have been diagnosed osteomyelitis, and the mistaken diagnosis not discovered even after operation and drainage. This variety of tumor is very malignant and usually has a characteristic roentgenographic picture. Furthermore, it is very susceptible to radiation therapy, and a therapeutic diagnosis is often made by a few treatments with the roentgen-ray. The tumor and symptoms rapidly disappear, to later reappear if further treatment is not given. Ewing, who described this tumor, strongly advocates that it never be incised even for biopsy and that the diagnosis and treatment be left solely in the hands of the radiologist.

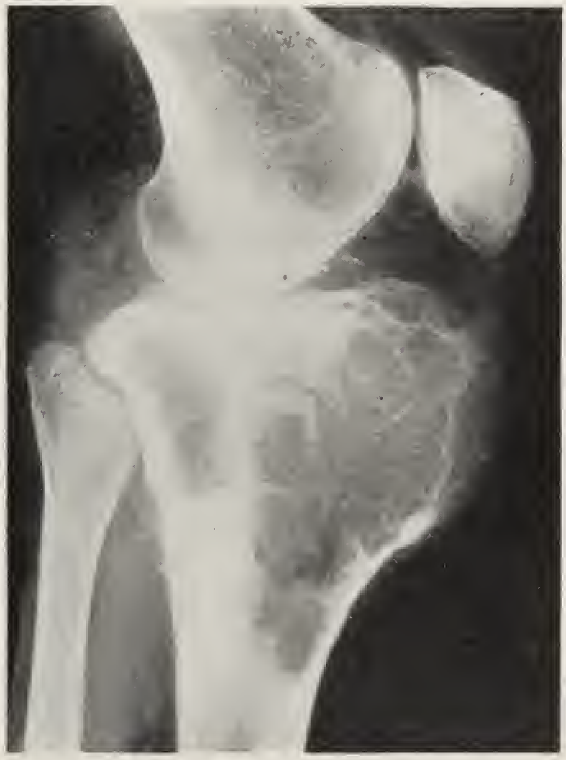

FIG. 3. GIANT-CELL TUMOR OF THE TIBIA

The majority of all giant-cell tumors have a definite roentgenographic picture and incision is not indicated. Pfahler and his associates, Herenden and others, have cured a large series of these tumors by radiation therapy. To the physician unacquainted with the roentgenographic picture of tumors of bones the roentgenograms of this tumor have a very malignant and dangerous appearance, and amputation is sometimes done without consulting a radiologist or a pathologist. Usually the first treatment with the X-ray causes a temporary exaggeration of the symptoms with swelling and edema. Many surgeons then imagine that X-ray treatment has increased the degree of malignancy, and they amputate immediately, making a cripple of what should be a healthy individual in a few months. Kirklin and I have recently reported a series of giant-cell tumors, some of which have a slightly variable roentgenographic appearance; these variations are usually diagnosed by means of roentgenograms, however.

All tumors of bone suspected to be malignant should be immediately given intensive X-radiation. If they are of the giant-cell type, there is an immediate reaction and usually an increase in severity of symptoms, with gradual subsidence and a rapid cure. If the tumor is an osteogenic sarcoma, intensive X-radiation gives the best chance of a cure, and there is time to study the case while doing the best thing for the patient. If the tumor is of the Ewing type, rapid improvement results. If it is of the benign variety, X-radiation prevents any malignant change, and after a complete diagnosis is made excision may be justified. Excellent results are now being secured by X-radiation of cysts of bone and osteitis fibrosa cystica, whereas little can be accomplished by surgical methods except in the single, isolated cysts or when a tumor of the parathyroid gland is present. Merritt has recently reported a case of osteitis fibrosa cystica which was greatly improved by X-radiation of the parathyroid glands. Roentgenograms of osteomas and osteochondromas are nearly always diagnostic of the type of tumor, but it is best to be safe and follow the above procedure and never resort to operation or biopsy except upon the advice of a competent radiologist.

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THE PRESENT STATUS OF RENAL SYMPATHECTOMY*

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Since renal sympathectomy was first described by Papin in 1924, numerous reports have appeared in the literature from many different parts of the world of satisfactory results from this procedure, and additional indications have been suggested. With recent improvement in our methods of investigation of the urinary tract we now have valuable aids in more accurate diagnosis of painful conditions of the kidney which have heretofore been designated by such terms as nephralgia, renalgia and sclerosing nephritis. Milliken in 1930 made an excellent contribution on the theoretical indications for renal sympathectomy, and Hess has described a very satisfactory technic for the operation.

The indications for renal sympathectomy now include the following:

1. Reflex anuria.

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2. Nephralgia, renalgia, sclerosing nephritis.
3. Early tuberculosis of the kidney.
4. Prevention of reformation of renal calculi.
5. Acute hypertension.
6. Renal sympatheticotonus.
7. Painful hyperdynamic motility of the renal pelvis.
8. Painful nephroptosis.
9. Early glomerulonephritis and other types of nephritis.

With this array of conditions for which renal sympathectomy has been advocated it is evident that much work has been and is being done on this subject.

When suppression occurs in reflex anuria because of extreme vasoconstriction of the renal vessels, renal sympathectomy will relieve the emergency of impending uremia through interference with the pathways of the sympathetic nerve, thus allowing the vessels to open and carry a greater volume of blood through their bed.

The group of conditions designated nephralgia, renalgia and sclerosing nephritis, include most painful affections for which an accurate diagnosis can not be made. These terms have originated because of ignorance of the underlying cause of the pain. Many of these cases will eventually be classified among the abnormal motility syndromes which will be described later. They all fail to give any clinical evidence of abnormality except pain of the type associated with renal disease.

Early tuberculosis of the kidney has been given as an indication for renal sympathectomy on the assumption that the resultant increase in blood supply would increase the protective forces of the body and thus promote cure of the condition. There hardly seems to be enough assurance of such satisfactory results to warrant its application in most cases. Furthermore the only experimental work (Pescoller) that has been on the change in resistance to infection of denervated kidneys has not only failed to prove that such kidneys are more resistant but, on the contrary, seem to be more susceptible than normal kidneys.

For the prevention of reformation of renal calculi following nephro- or pelviolithotomy, the operation seems quite rational on the basis that the urine of a sympathectomized kidney is greater in quantity and less in concentration of solids, because the enlarged vascular bed resulting from division of the vasoconstrictor nerves makes the precipitation of urinary salts from a concentrated urine less likely.

I feel very strongly that in every operation for renal stone everything that might promote adequate drainage and dilute the concentration of the urine should be done. There are technical difficulties, however, in many cases of renal calculous that make renal sympathectomy impractical and unwarranted. First, there is the high-lying kidney which is very difficult to mobilize sufficiently well to accomplish pelvio- or nephrolithotomy. In these cases sympathectomy would in most instances unduly prolong the operative procedure and should not be attempted. Secondly, there are those cases in which previous operative procedures or perinephritic inflammatory processes have so firmly fixed the kidney and its vascular pedicle that dissection is either very difficult or impossible. These also should not be subjected to attempted sympathectomy. In most instances at the initial operation for renal calculous it is a relatively simple matter to strip the renal pedicle of its nerve plexus and assure dilution of the urine and an unobstructed pathway for drainage.

In cases of acute hypertension Milliken suggested that it would probably be of value in lowering the blood pressure. In the light of recent contributions to surgery of the sympathetic nervous system in hypertension this indication seems to be without adequate foundation. Steinkopff's book gives evidence that even though large splanchnic areas may be released from vasoconstriction by radical sympathectomy, the control mechanism which is located in the carotid vessels will maintain the same high blood pressure through compensatory vasoconstriction of the rest of the vascular tree. Craig and Brown have shown that even with very radical procedures such as removal of sympathetic chains supplying the splanchnic area, removal of one adrenal and denervation of the other, the systolic pressure is but slightly reduced and the diastolic depressed only for a few months. With this evidence at hand renal sympathectomy for hypertension is most assuredly not warranted except in some of those rare instances in which the vasoconstrictor mechanism in the carotids is not functioning, in which case satisfactory results might occur.

Renal sympatheticotonus, first described by Harris and Harris as a definite clinical entity recognizable by pyeloscopy, was the indication for sympathectomy in 28 cases in all of which they reported satisfactory results in 1930. This syndrome consists of localized spasm in any portion of the renal pelvis accompanied by pain and relieved by eserine, and not associated with obstructive or inflammatory lesions. I have recognized a number of these cases of such syndromes but so far have had satisfactory results with the administration of eserine, so that even if I had suggested surgical treatment I question whether the patients would have accepted it.

Painful hyperdynamic motility of the renal pelvis is a painful syndrome due to abnormal motility which I have described. It consists of an extremely hyperdynamically contracting renal pelvis which will not retain its contents long enough to allow a satisfactory urogram to be made. This is very easily recognized by pyeloscopy, and in the one case which I recognized eserine and other forms of medication did not relieve the pain. Renal sympathectomy was performed. Fortunately, it proved satisfactory in relieving the pain by making the tendency to spasm subnormal.

Painful nephroptosis, so long a subject of controversy, is in most instances adequate indication for renal sympathectomy or for renal sympathectomy with some form of nephropexy when all other means have been tried to relieve the pain and have failed. As our time is short I can only touch the high spots in the subject. I would remind you that many of the world's most noted surgeons have advocated nephropexy for painful nephroptosis, and that Kidd and Kimbrough are among those who routinely intentionally perform renal sympathectomy as a step in the operation of nephropexy. Many others unwittingly accomplish sympathectomy of variable degree because their technic of mobilization is such that they could not help but interrupt many of the nerves in and about the renal pedicle. According to our own observation the technics which accomplish the most complete mobilization and consequently the most nerve destruction are accompanied by satisfactory results in the hands of those who employ such dissection. It is among those who do not even visualize the renal pedicle in their technic that we find dissatisfaction with nephropexy.

Renal sympathectomy for glomerulonephritis, acute nephritis and acute infectious nephritis is a large subject, and other than mentioning the work of Harris and Harris, Rowntree, and Denk, I will not discuss it further than to say that the results of surgery in many cases seem to promise considerable in the handling of such conditions. Obviously, the beneficial results experienced are due, most probably, to the increased vascularity of the kidney resulting from the interruption of the vasoconstrictor fibers.

The technic of renal sympathectomy varies considerably with different surgeons. Papin first described a very tedious painstaking technic in which he used a magnifying glass and grooved director to identify, mobilize and section each small nerve fiber found around the renal vessels. Later, so Guiterez tells me, he sectioned the larger bundle of nerves running along the superior order of the pedicle, decapsulated, and in addition, performed nephrostomy. Hess, who has written much about renal sympathectomy in this country, does a moderately complete stripping of the vessels, mobilizes the ureter as far down as he can and then drops the kidney back to whatever position it will take, without any fixation whatever. Harris and Harris do a moderately complete stripping and stress the importance of stripping the larger vessels toward the kidney rather than from the kidney, because of less likelihood of breaking small vessels from the kidney with accompanying troublesome bleeding. Major Kimbrough is with us tonight and I am sure he can tell about his technic better than anyone else. He has done more sympathectomies than anyone I know of, and what is more, has recently followed his cases postoperatively with pyeloscopic observation, some of which it has been my privilege to witness.

My own technic consists of moderately complete stripping of the renal vessels with removal of the fat of the pedicle which contains nerve fibers, complete mobilization of the ureter as far down as possible and either no fixation or just one or two stitches, as I see fit. I keep the patient in bed from 14 to 21 days after the operation, the first 5 with the head low, the foot of the bed elevated and a moderately tight abdominal binder in place.

The results of renal sympathectomy in the motility of the upper urinary tract, and consequently the drainage, seem to be variable. In some cases in which there is moderate relaxation and atonicity the result is a definite increase in tone. In some cases in which there is spasticity and hypertonus the result is definitely increased tone. In some cases there is no change. I have seen many of Hess' urograms before and after operation. I have seen a number of Kimbrough's and it is from these observations and those on my own patients that I make the above statement. I have seen evidence of return to the original pyeloscopic picture as soon as 8 months after operation.

In conclusion it may be said that renal sympathectomy is a very valuable procedure for many renal conditions, and that as time goes on and our experience becomes richer, it will probably take a more and more important place in renal surgery.

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DISCUSSION

Major J. C. Kimbrough, Walter Reed Hospital: The work of Dr. Herbst in the investigation of pyeloscopy and renal sympathectomy has been a valuable contribution to urologic literature. This splendid presentation is so complete and thorough that there is little left for consideration in the discussion. Pyeloscopy in addition to its value as a diagnostic procedure has been a great aid in developing the knowledge of the physiology and pathology of the renal pelvis and ureter. It does not replace intravenous and retrograde urography but rather supplements these examinations in the study of the genitourinary tract. In studying urological cases many patients with renal pain of the nephralgia and renal colic types are found with normal urograms by the retrograde or intravenous method. These patients return from time to time with recurrent or continuous attacks. Pyeloscopy often demonstrates pathology such as hypermotility, spasm of a calyx or functional obstruction at the uretero-pelvic juncture, and it indicates the method of rational treatment. The diagnosis in patients with indefinite abdominal symptoms and negative gastrointestinal examination is established often by studying the functional activity of the genitourinary tract by pyeloscopy. Some cases of so-called essential renal hematuria are caused by hypertonicity of the muscle of the renal papillae. The diagnosis in these cases can be made by pyeloscopic studies. The chief source of possible error in pyeloscopy is due to the presence of the ureteral catheter and the high concentration of the opaque solution. These are irritating and probably increase the activity of the muscular contractions or cause aberrant peristalsis of the renal pelvis and ureter. With the present iodine compounds used for intravenous urography fluoroscopy of the renal tract has not been satisfactory. Improvement in the x-ray density of the uroselectan and skiodan group will reduce the errors of pyeloscopy to a minimum. With the information gained by study of the autonomic nervous system in recent years operative treatment of many conditions has been initiated. Megalocolon, Raynaud's disease, thromboangiitis obliterans and hypertension have been so treated. The indications, operative technic and postoperative results in many of these conditions have not been uniformly successful or constant. The anatomical arrangement of the nerve supply of the kidney and renal pelvis in the isolated renal pedicle made this organ particularly available for sympathectomy. I have employed the operation with satisfactory results in cases of nephralgia, renal rotation with pain, hematuria and painful nephroptosis. For the reasons mentioned by Dr. Herbst it is advisable to make sympathectomy a part of the technic of operations for nephrolithiasis and other conditions that make necessary renal mobilization. Pyeloscopy is a definite aid in determining the advisability of instituting operative procedures in cases of nephroptosis. Its use enables one to estimate the degree of obstruction and the presence of aberrant peristalsis more accurately than is possible by employing other urographic studies. Various types of technic have been employed. It is believed that vessels of the renal pedicle should be denuded of nerve tissue as completely as practicable without injury to the vessels. Decapsulation, partial or complete, adds to the efficiency of the operative results. The pelvis and the ureter should be separated as far distal as possible from fibrous tissue, and angulations should be made straight. It appears that the ureter can be stripped with impunity provided that the ureteral sheath is not materially injured. If the sheath with the ureteral vessels is removed, atony, dilatation, hypomobility and in some cases ureteral dissolution will result. Fixation of the kidney in normal position should be practiced in all cases of renal mobilization, operations for calculus, nephroptosis, renal rotation, etc. This is a harmless procedure and prevents postoperative deformities of position which may cause inadequate drainage.

Further discussion participated in by **Dr. Francis R. Hagner.**

COLECTOMY FOR CHRONIC ULCERATIVE COLITIS AND POLYPS*

Report of a Case

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Report of Case

An unmarried woman, aged 28 years, who was formerly a teacher, but is now employed as a secretary, was referred to me by Dr. F. H. Shaw of Wellsboro, Pennsylvania, on May 5, 1930. Her family and personal history has no bearing on her present condition. The patient's chief complaint was the passing of frequent, bloody stools. The initial attack occurred in the spring of 1922, when for a week she had about 5 bloody stools a day. She lost her appetite, a great deal of weight and her customary energy. After 1 week the diarrhea disappeared, she did not gain in strength or weight and she was unable to resume her teaching. Her physician prescribed a diet, medicines and daily saline irrigation of the bowel. She improved somewhat. In 1923 she resumed her work and taught for 2 years. She was fairly well most of that time. She noticed mucus in the stools but no blood. In the spring of 1925 the patient had a very severe recurrence of her trouble with from 10 to 12 blood stools a day, containing more blood than during the attack in 1922. She was in bed for 12 weeks. Medicines by mouth were given but no irrigations of the bowel. She had nausea and vomiting and could take very little food. She stated that she had a rise in temperature during all of the time that she was in bed but that she does not know the degree. She had pain in her abdomen, especially when her bowels moved. She lost between 30 and 40 pounds. Since the attack in 1925, the patient has had several similar ones, some as severe, others milder. At that time she went to the Robert Packer Hospital at Sayre, Pennsylvania, where a study of the colon was made by x-ray and by the sigmoidoscope. She stated that the roentgenogram did not reveal any pathological condition and that the sigmoidoproctoscopic examination showed a decided thickening of the mucous membrane of the bowel but no ulcers. Silver nitrate irrigations were prescribed. In July, 1927, the patient returned to the Robert Packer Hospital, where a second sigmoidoproctoscopic examination revealed ulcers, for which a treatment was prescribed. For a month prior to my examination the patient had been having 6 or 7 unformed, bloody stools a day, although they have been slightly more formed the past few days. When her bowels moved she had pain, especially in her left side. Her temperature had been normal in the morning but there had been a slight rise in the afternoon. Her appetite was poor. She had been on a diet for the past 5 years. She stated that she had spasms in her abdomen at which time she could feel gas in certain areas, but there was no belching or bloating. There was no urinary trouble. Occasionally, when the patient was weak, the heart action was rapid. Swelling of ankles, hands, or feet, was not observed. There was no chronic cough and no sputum. There was only occasional nervousness.

Examination May 6, 1930, revealed by proctosigmoidoscopy 2 tumors in the rectum about 12.5 cm. from the anal orifice; 1 a small sessile tumor, the other pedunculated. The pedunculated growth was bleeding. The mucous membrane of the bowel was covered with a thick exudate. When the exudate was wiped off the mucous membrane was observed to be congested and to have numerous petechial and grayish spots. With a platinum loop, material was taken from these spots for bacteriological study. The Diplostreptococcus of Bargen was not found. On May 8, 1930, a proctoscopic examination was made by Dr. J. Arnold Bargen. He was not positive that the patient had ulcerative colitis. He advised the removal of the polyps and further bacteriological study. Through an operating proctoscope the 2 adenomatous polyps were removed from the rectum 2 days later. A pathological study of the tumors did not reveal any evidence of a malignant lesion. On May 13, 1930, a rectosigmoidoscopic examination showed that the areas from which the polyps were removed were healing. The bowel was still covered with numerous petechial and grayish spots. More material was obtained for bacteriological study and the Diplostreptococcus of Bargen was found in the cultures. A vaccine and a bacterial filtrate were prepared by Dr. Tomas Cajigas. During the preparation of the vaccine and filtrate the patient was referred for tonsillectomy. The patient was then sent back to her family physician, and the vaccine and filtrate were forwarded for the treatment. After a month, Dr. Shaw reported that for the first 3 weeks after the patient's return there was no noticeable progress but that she then began to feel a great deal better. There has been no mucus or blood in the stools. She has had very little pain except occasionally from gas. Her afternoon temperature had been from 99°F. to 100°F., until 3 days before, when it remained normal all day and had since been normal. Her strength had gradually increased but her weight had remained stationary since her return. A month later Dr. Shaw wrote that the patient's general condition was much improved and that she was much stronger. Another month passed and Dr. Shaw reported that he felt very much encouraged about his patient's condition. She had gained 3 pounds in weight. There was practically normal bowel function. On October 2, 1930, a rectosigmoidoscopic examination showed a very noticeable improvement in the condition of the bowel. Few ulcers were observed. Material was taken for bacteriological study. The Diplostreptococcus of Bargen was found and another vaccine and bacterial filtrate made. On January 19, 1931, Dr. Shaw reported that the patient's physical condition was greatly improved. She had gained 4 pounds in weight. The bowel movements were normal and did not contain blood or mucus. She still had some pain in her left side. The vaccine had been continued up to this time. On March 12, 1931, Dr. Shaw reported that about a month before the patient had had a "cold." Symptoms of colitis had returned. She began passing some mucus and twice the mucus had been streaked with blood. On April 24, 1931, a rectosigmoidoscopic examination showed numerous ulcers in the rectum and sigmoid. The ulcers bled freely and many of them were covered with a thick exudate. Material was taken for cultures. The Diplostreptococcus of Bargen was again found and another vaccine and bacterial filtrate were made. An x-ray study was made of the gastrointestinal tract by Dr. A. B. Moore. He reported that a roentgenogram of the large bowel taken after a barium enema showed evidence of ulcerative colitis involving the sigmoid and descending colon. There was an irregular area in the lower sigmoid which he thought to be a polyp or a deep ulcer. As I had removed 2 polyps from the rectosigmoid the year before, I was inclined to think that the lesion was caused by a polyp, and I advised its removal. The patient did not wish to be operated upon at that time and she returned home. Her family physician continued to administer the vaccine and filtrate. In July, I was able to obtain a supply of chronic ulcerative colitis serum from Sharp and Dohme, which was made according to a method of Dr. Bargen and which I forwarded to Dr. Shaw for administering to the patient. The course of treatment was completed on September 15, 1931. Dr. Shaw reported that during July there had been some mucus and blood in the stools, that the patient had considerable pain in the left side and that she weighed 100 pounds. The bowel movements then became normal. The patient had gained over 8 pounds. On October 15, 1931, a rectosigmoidoscopic examination showed the bowel to be in a very good condition. There had been no recurrence of the rectal polyps which had been removed in May, 1930. There was no ulceration. There was a slight edematous condition of the mucous membrane of the bowel, but the use of the instrument and the wiping of the surface did not cause bleeding. Another roentgenogram showed the filling defect which had been found at the previous study. I advised the patient to have an abdominal operation for its removal, as I did not think it was safe to allow the polyp to remain. I was fearful that the tumor might become malignant if it were allowed to go untreated.

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* Read before the Medical Society of Virginia, Maryland, and the District of Columbia, May 18, 1932.

At operation, January 22, 1932, the abdomen was opened through a low, left, paramedian incision. Exploration revealed the left half of the colon to be noticeably thickened and congested. A few enlarged lymph glands were observed along the spine, in the root of the mesentery, and in the great omentum. No other pathological condition was noted. The polyps which had been diagnosed by roentgenogram could not be palpated. Because the patient had chronic ulcerative colitis and the colon was so thickened and congested, it was thought advisable to do a colectomy, rather than to attempt a resection of the area where the polyps had been noted at the time of the roentgenographic studies. The entire colon was resected by dividing the terminal ileum about 10 cm. from the ileocecal valve and by dividing the colon above the rectosigmoid. The great omentum was removed from the anterior surface of the colon. This was accomplished without bleeding. All of the blood vessels in the mesentery of the colon and in the transverse mesocolon were clamped, divided, and ligated. The peritoneum in the right side of the abdomen was closed by suturing together the 2 cut edges. The transverse mesocolon was sutured to the under side of the stomach along the greater curvature. The continuity of the bowel was reëstablished by making an end-to-side ileosigmoidostomy with the use of Murphy's button. A few interrupted, reënforcing sutures of silk were placed about the anastomosis to strengthen it. The edges of the mesentery of the small intestine and the stump of the sigmoid were sutured to the posterior peritoneum to obliterate an opening which had been formed when the ileum had been carried across to be united to the sigmoid. This was done to prevent the possibility of a coil of the intestine passing through the opening and becoming obstructed. The great omentum was then placed over the intestines, and the abdominal wound was closed in layers without drainage. Just before closing the abdomen a jejunostomy was made over a catheter by the method of Witzel. The end of the catheter was brought out through a hole in the great omentum and through a stab wound in the left side of the abdomen. The jejunostomy was made in order to drain the upper portion of the bowel and to have an opening through which fluids could be administered. Following the operation the patient had a convalescence which was without incident. On February 6, 1932, a roentgenogram of the lower bowel taken after a barium enema showed the anastomosis of the ileum to the sigmoid to be about 20 cm. above the anus. The anastomosis was patent. On March 15, 1932, the patient reported that she was in excellent condition and was about to return to work.

Pathological study of the colon revealed on gross examination 2 polyps in the sigmoid. They were attached to opposite points of the bowel so that the projecting portions of the tumors were in contact with one another. The mucous membrane in the left half of the bowel was thickened and congested. In the ascending colon it was decidedly thickened but less noticeably so in the transverse colon. No ulcers were observed. The right half of the colon was practically normal. A pathological study of the tumors showed them to be adenomatous polyps. There was no evidence of malignancy.

COMMENT

This case, which seemed to be an intractable one of chronic ulcerative colitis, is being reported because it presents several interesting features:

1. The chronic ulcerative colitis could not be kept under complete control by vaccine or the chronic ulcerative colitis serum of Bargen.
2. The colectomy was done because of the progressive nature of the chronic ulcerative colitis.
3. The polyps were removed in order to stop the bleeding and to eradicate a possible source of malignancy.

Note: On August 9, 1932, the patient wrote, "I think you will be pleased to hear that I am feeling fine and have no complaints, for which I am thankful." She has gained 13½ pounds.

Science Series. No. 10

MODERN METHODS OF TESTING LIVER FUNCTION

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Within recent years there has been developed a large number of tests designed to be of aid in the clinical study of liver disease. An attempt will be made to state briefly the physiological principles underlying some of the more useful tests and to state the results of experimental and clinical experience with them.

It is wise to approach this subject with the knowledge gained from kidney function tests and not to expect more clinical aid than one should from such a laboratory test of the functional capacity of an organ. Function tests have not proved of much value in the prediction of etiological factors or of underlying pathological changes. However, they have proved themselves of value in the following ways: (1) In the making of the early diagnosis of liver disease; (2) in determining the severity of the condition; (3) in following the course of the disease and in studying the effect of therapy upon it by repetition of the tests; (4) in making the differential diagnosis of disease of the liver from other conditions. An attempt will be made to evaluate the tests in the light of their clinical value.

THE QUANTITATIVE ESTIMATION OF BILE PIGMENTS IN THE BLOOD

THE VAN DEN BERGH REACTION

For this purpose Van den Bergh and Snapper made use of an observation of Ehrlich, that bilirubin can be diazotized to form a highly colored red-violet compound. They so developed this color reaction that the bilirubin in the blood could be quantitatively estimated. This opened up a new field in the experimental and clinical study of jaundice and pigment metabolism. It was thus shown that the normal yellow color of human serum is due to bilirubin, which is present in concentrations of 0.1 to 0.5 mg. per 100 cc. of blood in normal adults. In infants higher concentrations are present. Fasting has also been shown to increase the bilirubinemia. Van den Bergh and Snapper showed that two forms of jaundice occurred, one in which a positive reaction was obtained when the diazo reagent was added directly to the serum, and the other in which the reaction occurred only when the bilirubin was dissolved out of the serum by alcohol. It was believed by them that the direct reaction was characteristic of obstructive jaundice and hepatitis while the indirect reaction (on the alcoholic extract) was characteristic of hemolytic jaundice (hemolytic icterus and pernicious anemia). It has been fully confirmed that outspoken obstructive jaundice will give the direct reaction, and hemolytic jaundice the indirect reaction, but it has been found that a considerable percentage of cases of jaundice due to liver disease may fall either into one group or the other, and may change from one type of reaction to the other during the course of the disease, so that differentiation of types of jaundice cannot be unreservedly made on this basis. It has been suggested that the change from one type of reaction to another in a given case of hepatic disease may be interpreted in terms of pathological changes taking place in the liver (Barron). In 1925 I demonstrated that bile salts could dissociate bilirubin from the serum proteins, and Barron later showed that the Van den Bergh reaction could be changed from indirect to direct by the addition of bile salts. This offers an explanation of the direct reaction in obstructive jaundice, in which bile salts are retained in the blood, and the indirect reaction in hemolytic jaundice, in which they are absent.

Apart from the value of the Van den Bergh reaction in differentiating jaundice of hemolytic origin from jaundice of hepatic origin, the outstanding contribution of this test is the quantitative measurement of the bilirubin in the blood. The severity of jaundice can in this way be measured and the course of the condition accurately followed.

Many individuals in whom it would be impossible from clinical observation to establish the presence of jaundice can be shown to have an increase in bile pigments in the blood; these cases comprise the group of "latent jaundice," frequently encountered in early liver disease and cholecystitis. While the bromsulphalein test is more frequently positive in this group of cases, the measurement of bilirubinemia is also of great value and at times is the only test yielding positive results (Cantarow).

In contrast to the increase in serum bilirubin as observed in pernicious anemia and hemolytic icterus an abnormally low value, hypobilirubinemia, is observed in the secondary anemias, and also in some cases of chronic nephritis.

Another test based upon bilirubinemia was recently brought out by von Bergmann who injected bilirubin intravenously and estimated its subsequent disappearance from the blood. Promising results have been obtained with it by other workers abroad, and in this country by Harrop and Barron. It remains to be proved, however, that bilirubin injected in this manner is not taken up by the entire reticulo-endothelial system.

THE ICTERUS INDEX

For the purpose of estimating the amount of bile pigment in the blood, Meulengracht employed a direct comparison of the serum with a 1 to 10,000 dilution of potassium bichromate. A known quantity of serum is diluted with 0.9 per cent sodium chloride until the colors are of similar intensity. The number of times the serum is diluted represents the icterus index. Normally this varies from 4 to 6 (0.1 to 0.5 mg. per cent bilirubin). Under controlled conditions this simple procedure is as accurate as the quantitative Van den Bergh reaction, but in certain individuals an increased yellow color of the serum is due to the lipochromes, carotin and lutein, absorbed from the vegetables, egg yolk, or fats of their diet. Particularly in cases of latent jaundice, therefore, the Van den Bergh test should be also employed to eliminate the possibility of errors due to carotinemia. Hemolysis will also introduce an error in the readings obtained with the icterus index.

Tests of Liver Function with Dyes

The modern methods of testing liver function with dyes began in 1922 when I demonstrated that it was possible to detect liver damage by injecting phenoltetrachlorphthalein intravenously and determining the rate of removal of this dye from the blood stream. Normally it disappears entirely in one-half hour, but in liver disease high concentrations remain in the blood for many hours. This dye had previously been shown by Abel and Rowntree to be excreted in the bile, and had been applied by Rowntree as a test of liver function, based upon the estimation of the dye excreted in the feces.

Rosenthal and White later discovered a new phthalein dye, bromsulphalein, that was removed from the blood entirely by the liver, and was excreted in the bile with remarkable rapidity. Eighty-five per cent could be recovered in the bile of rabbits within 2 hours after its intravenous injection. By taking out varying amounts of rabbits' liver, a relationship between the amount removed and the degree of retention of dye in the blood could be demonstrated. Pratt, et al., showed that in dogs with the entire liver removed, practically no dye left the blood in 30 minutes, while normally it is all gone in 15 minutes after injection in dogs.

A possible mechanism of the excretion of dyes by the liver was shown (Rosenthal) in that bromsulphalein was firmly absorbed to the serum proteins and in this way being prevented from excretion by the kidneys, but by virtue of their effect on surface tension bile salts are capable of liberating the dye from the proteins.

Rosenthal and Bourne, studying the effects of anesthetics on the liver in dogs, found the bromsulphalein test more sensitive to liver damage than the degree of bilirubinemia or the urobilinogen excretion.

In humans the bromsulphalein test is carried out by injecting the dye intravenously and obtaining a sample of blood in 30 minutes (also at 5 minutes in early liver disease). The dye is estimated in the serum by comparison with a series of standards. Normally in one-half hour the liver has entirely removed the dye from the blood.

The specificity of this test is of considerable importance. Experimental and clinical experience has shown that in no case in the absence of liver disease is there retention of dye. Definite retention is almost certain evidence of liver damage.

Rose bengal is another phthalein dye, introduced by Delprat, to study liver function in a manner similar to bromsulphalein. In animal experiments we (Rosenthal and White) have produced evidence that it is not taken up as specifically by the liver as is bromsulphalein, while in humans reactions have been reported following its use.

UROBILIN AND UROBILINOGEN EXCRETION

That an excessive excretion of urobilinogen and urobilin in the urine occurs in liver disease and in the hemolytic blood diseases has been known for many years. The exact physiology of these pigments has been worked out by Elman and McMaster. They showed that they were formed only from bile pigments and only in the digestive tract (also in the bile ducts, if infected). Urobilin undergoes an anterohepatic circulation, being absorbed from the digestive tract and re-excreted, chiefly by the liver. Normally only small amounts of urobilin, and its precursor urobilinogen, appear in the urine, but when the liver is damaged and cannot normally excrete these pigments, an increased urinary excretion occurs. Increases also occur in pernicious anemia and other hemolytic diseases, in which an excess of bilirubin (formed from the excessive breakdown of hemoglobin) is poured into the alimentary tract and hence an excess of urobilin formed. Fundamental errors in this test as a means of measuring liver activity are: (a) In severe liver disease or obstructive jaundice, in which there is suppression of bile entering the intestine, a corresponding suppression of urobilin formation results; (b) the quantitative test, which is based on Wallace and Diamond's application of Ehrlich's dimethylaminobenzaldehyde reaction, detects only urobilinogen, and this is oxidized to urobilin on standing. Thus analyses of 24-hour samples of urine may give values too low; (c) results are influenced by the condition of the gastrointestinal tract; normally a large part of the urobilin formed is excreted in the stools and anything which will increase absorption, such as constipation, will increase the amount appearing in the urine; (d) in the presence of nephritis the excretion of these pigments in the urine may be impaired.

The quantitative method of McMaster and Elman, which measures both urobilinogen and urobilin, applied to 24-hour samples of urine, is the most accurate application of this method of study.

SUGAR TOLERANCE TESTS FOR LIVER FUNCTION

The tolerance of the body toward various sugars has been employed for many years as a means of studying the functional activity of the liver. The sugars are given by mouth or intravenously, and the effect noted upon the sugar of the blood or urine. Glucose is converted into glycogen in the liver, and some sugars such as fructose and galactose are changed into glucose and glycogen by the liver. By virtue of its glycogen reserve, Mann and his co-workers have shown the important rôle of the liver in maintaining the blood sugar at a constant level. These processes may to a certain extent also take place in other organs.

The metabolism of sugars is influenced by too many body functions to accept their behavior as a specific means of estimating liver activity. The conversion of fructose occurs only partially in the liver (Bollman and Mann) but galactose is thought to be more specifically handled by this organ (Shay, Schloss and Bell). While sugar tolerance tests have found favor in European clinics, the experience of most American workers in this field conforms with that of Althausen; group differences can be shown between a number of cases of hepatic disease and a number of cases without liver disease, but the fluctuations in each group are sufficiently wide to make the results of little diagnostic value in an individual case. The modified procedure of Althausen, whereby insulin is given along with glucose and the drop in blood sugar taken as a basis of the test, appears to be more sensitive to liver disturbances and more specific. This test is based on the principle that the ability of the liver to transform glycogen to glucose to combat the insulin hypoglycemia is impaired in disease. Further usage must establish the value of this procedure.

The differentiation between jaundice due to obstruction of the bile ducts and that caused by hepatitis (yellow atrophy, catarrhal jaundice, spirochetal jaundice, etc.) is of vital importance from the standpoint of the therapy to be instituted. While the hyperbilirubinemia and the bromsulphalein retention tend to be higher in the latter cases, a sharp differentiation cannot be made on this basis. There is great need of a reliable test for this purpose. While Shay and Schloss consider Bauer's galactose test of value here, Althausen and Mancke are of an opposite opinion. Wier and also other workers at the Mayo Clinic obtained disappointing results with the fructose tolerance test in the differential diagnosis of these cases. Future experience may show Althausen's modified glucose tolerance test to fulfil this need.

There are a large number of other liver function tests that have been brought out in recent years. These have been designed to test other phases of liver physiology, particularly the detoxifying function of the liver and its rôle in the metabolism of proteins and lipoids and in the regulation of water balance. While many of them are of physiological interest they have either proved of little value in the clinic or their worth has not yet been established. Space will not permit their individual consideration.

APPLICATION OF TESTS

The important researches of Mann and his associates at the Mayo Clinic have shown that in mammals bilirubin is largely formed outside the liver. Estimations of the bilirubin in the blood test, therefore, the ability of the liver to take up this substance and excrete it. In this sense the dye tests of liver function are based on the same principle, and in obstructive jaundice a close correlation of the tests occurs. However, in chronic liver disease and in certain types of acute injury to the liver cells there is often a much greater impairment of function by the dye test than is shown by the bilirubin estimations. In cirrhosis, except during the acute flare-ups of hepatitis which occur in this disease, an increase of bilirubinemia occurs only occasionally, while the bromsulphalein test will show impairment of function in the majority of cirrhotics. Here the dye test is of great value, although a normal result does not rule out cirrhosis. Greene, McVicar, Snell and Rowntree found serum bilirubin values in 28 cases of portal cirrhosis with ascites but without clinical jaundice to be above normal in only 25 per cent of them, while the dye test showed abnormal retention in 96 per cent of the same cases. Similarly, in 19 cases of carcinoma of the liver without jaundice, these investigators also found that only 10 per cent showed abnormal bilirubinemia while 60 per cent showed dye retention.

Clinical experience has established the fact that the bromsulphalein test is more sensitive to detect lesser degrees of liver damage than are the disturbances in bile pigment metabolism. Experimental results show similar findings (Rosenthal and Bourne). It must also be pointed out that removal of 80 per cent of rabbits' liver causes approximately 80 per cent of dye retention, and that Rous and Larrimore found no bile pigments in the blood or urine of rabbits and dogs after the removal of this amount of liver tissue.

While in chronic liver disease the dye test will be positive more often than the serum bilirubin, some cases of latent jaundice occur in which an increase in serum bilirubin is present without any dye retention, so that both tests should be employed. The jaundice of the hemolytic blood diseases is characterized by the absence of dye retention (Greene, McVicar, Walters and Rowntree), indicating that in uncomplicated cases there is no disturbance of liver function in hemolytic icterus and pernicious anemia.

In cases of jaundice due to acute liver disease there is usually but not always a parallelism between the retention of dye and the degree of hyperbilirubinemia. Further experience must reveal whether these differences can be interpreted in terms of damage to the liver cells. The use of the carbohydrate tolerance tests in differentiating the jaundice of biliary obstruction from the jaundice of hepatitis has already been considered. Besides to the internist and surgeon, liver function tests have been of service in other specialized fields. Their use to the syphilologist (O'Leary, Greene and Rowntree) may be mentioned as an example.

Not all cases of liver disease show impaired function by these tests. This is particularly understandable in chronic disease, in which the liver has a chance to exert its remarkable ability to regenerate and undergo compensation. If over 80 per cent of the liver of animals is removed the remaining portion will grow back to the original size or greater within a month (Rous and Larrimore). However, in liver disease the presence of infection, toxins, and scar tissue often hinder this regenerative process.

Just as with kidney function tests, so with liver function tests it is true that in order to obtain the most from them, a knowledge of their value and limitations is required, and their results must be correlated with the entire clinical picture.

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ABSTRACTS OF PAPERS READ BEFORE THE SOCIETY

"WASHINGTON'S MEDICAL KNOWLEDGE AND ITS SOURCES,"* by **Wyndham B. Blanton, M.D.**, Richmond, Va.

From Washington's diaries, account books and letters, one secures information to show that Washington saw and heard a great deal of the medicine of his day, knew intimately many of the doctors of his generation, and acquired ideas of his own relating to the cause and cure of disease. Washington believed in the virtues of mineral springs, in the use of quinine in large doses, in blood-letting and in the importance of diet. His attitude to smallpox was energetic. His correspondence is full of definite ideas concerning its communicability, the need for isolation hospitals, and the "amazing success" of inoculation. He insisted on the inoculation of the members of his family, his slaves, and of the recruits in the Continental Army. His influence in the prevention of smallpox in America was probably as great as that of Cotton Mather, Benjamin Franklin, or Thomas Jefferson. He took a most personal interest in the care of the health of his slaves and made rounds of inspection, ordering patients to the plantation hospital when occasion demanded. He employed a full-time midwife, and nurses when necessary. Three successive physicians, Laurie, Rumney and Craik, were paid by the year for their medical services to his plantations. Specialists and surgeons were consulted several times, and at least three times Washington was the victim of quackery. His own illnesses—a serious case of smallpox, repeated attacks of diarrhea and malaria, pneumonia, a carbuncle, frequent colds, early dental trouble, and the loss of his teeth—forced upon him many opportunities for acquiring medical information. His acquaintance among doctors exceeded that of any other American of his time. The diaries alone mention 65 physicians, most of whom visited him at Mt. Vernon, and show him on terms of intimacy with the leading practitioners in New York, Philadelphia and Virginia. Some of these were Samuel Bard, Thomas Bond, Benjamin Rush, Thomas Cadwalader, John Redman, William Shippen, John Morgan, David Stuart, William Pasteur and Hugh Mercer.

"THE LAST ILLNESS AND DEATH OF WASHINGTON,"† by **Walter A. Wells, M.D.**

News of the death of Washington came suddenly upon the country in no way prepared for such an event. The prevailing thought of him at the time—a thought that has persisted even to our day—was of a man of still robust health and enduring vitality. This, taken in connection with the fact that Washington died after an illness of only two days' standing, explains somewhat the association of a mystery with the nature of his last illness and cause of death. As a matter of fact, Washington had suffered many illnesses and his health at this time was much enfeebled. He had smallpox at the age of 19, and was in early manhood a frequent victim of dysentery and malaria. He had suffered much from throat and chest troubles throughout his whole life. On three occasions he was near death's door. Once in 1758, from what he, himself, thought to be comsumption; once in 1789, from a severe carbuncle of the hip; and a third time in 1790 from an attack of pneumonia, probably complicated with pleurisy. A diagnosis of the last illness of Washington can be based on the bulletin issued by his physician, and the complete account given by his secretary, Tobias Lear, all the data being analyzed in the light of present medical knowledge bearing on such a case. The conclusion seems reasonable that death was not due, as generally stated, to quinsy; nor as many think, to pneumonia; nor yet, as held by some, including the late Sir William Osler, to diphtheria; but rather to an affection, which today we designate as an edematous inflammation of the larynx, probably dependent upon a streptococcic infection. In answer to the question whether Washington was properly treated, one would answer, "Yes, according to the standard of the times; No, according to our own." In answer to the question whether excessive bleeding was the cause of death, one would say, "Certainly not of itself, though possibly contributory." Washington was the victim of an illness of great virulence, one tending almost inevitably toward death unless combatted by measures which we could not expect to have been applied in those days. To the question, could Washington have been saved if he had had the benefit of the art of medicine as now practiced, the answer is probably "yes." Our methods of handling such a case today are an immense improvement over those of a century ago. New therapeutic agents have been discovered, new instruments devised, and a new technic developed. Instead of working as then, in the dark, and depending upon the uncertain operation of general remedies, today we would be able to apply treatment directly to the organ affected. If medicine alone proved insufficient, we would resort to surgical measures, either tracheotomy, then but little known and almost never employed in such a case, or intubation, an entirely modern procedure. The physicians in attendance upon Washington were college trained, skilled men. Dr. Craik, probably the most intimate friend of his life, was a graduate of Edinburgh and an experienced surgeon of Colonial and Revolutionary wars. Dr. Brown was also a graduate of Edinburgh and an eminent practitioner living at Port Tobacco, across the river in Maryland.

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* Presented October 12, 1932.

†Presented October 12, 1932.

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PROGRESS IN MEDICINE

There is no greater paradox than that illustrated by the course of progress in the field of the so-called medical sciences. Progress is at the same time slow and devious but swift and certain. This is true not only in the field of clinical investigation but in the realm of laboratory research as well. In many ways laboratory investigation and clinical medicine are dependent upon each other. New facts learned from the test tube and from animal experimentation must be tested in patients to determine their value and practicability. Everyone is cognizant of the great difficulty in judging therapeutic results. A new treatment must be tried when other forms of therapy for the same condition are eliminated as a factor in any improvement that may occur, and a large group of control cases must be carefully studied. A good illustration of the difficulties is the case of serum therapy for lobar pneumonia. Here, even after many patients had been most carefully studied by competent workers, the results were by no means conclusive. It appeared that this form of therapy was undoubtedly of some efficacy in pneumonia due to pneumococcus type 1 and possibly type 2 under favorable conditions, but the practicability of serum therapy as a routine procedure is, after years of trial, still far from settled.

The case of insulin therapy in diabetes mellitus was somewhat different, inasmuch as the question of efficacy was never a serious one. After years of experimentation by many well qualified research workers an extract of insulin was finally made that could be used. While Banting and Best finally succeeded in isolating the hormone and deserve great credit therefore, we should not forget the large number of other men who diligently worked on the same problem. After the method of extraction of insulin had been learned in the laboratory the problem of its proper usage and value clinically had to be worked out by those who dealt with patients. In the span of a few short years this has been done with great thoroughness, although new facts regarding these phases are still being accumulated and a form of insulin is still being sought which can be used per orum.

When one looks back over the progress made in the last fifty years he is astounded at the rapid stride which has been attained and yet, when one contemplates how much still remains a mystery in the field of medicine, he is overwhelmed. This very state of affairs, however, but goads the wide-awake, scientific physician to greater efforts. He derives encouragement from past successes and girds his loins for future struggles.

Although much of the progress in recent years has been acquired by laboratory workers, a great deal of work has been done by them which did not bear fruit. Many hav espent years pursuing a false lead, and others have obtained results which could not be substantiated. Much of the work done has not been of great value in every-day medicine; but facts must be accumulated, and no one can say which ones will lead to great practical use in some way. Clinicians once looked askance at research men as being impractical, cold blooded or lazy. Now the pendulum has swung too far, however, and research work is considered to be the only worthwhile form of activity in the medical field. Laboratory research is being over-emphasized, and many are entering upon it who are not qualified either by intellectual stamina or by temperament. Research men are now inclined to look down upon clinicians. They are apt to forget that the greatest value of their work comes in its application at the bedside, and this important work must be done in collaboration with clinicians.

Clinicians have, therefore, an important part to play in the advancement of the medical sciences. They are prone, however, to be too hasty in drawing conclusions and are apt to make false judgments. They are often too gullible, too easily influenced by men with great names and too easily persuaded by publicity campaigns of manufacturing houses. Great caution is necessary in evaluating various therapeutic procedures. This has been demonstrated frequently by the coming and going of medical fads, much to the detriment of the reputation of medical men. A warning must be issued and frequently reiterated, therefore, that old, well established treatments be used by those not fortunate enough to be in a position themselves to properly evaluate new methods. These men should wait until new forms of treatment have been thoroughly tried by those qualified to test them. Conservatism by the rank and file is best. When a new treatment is advanced its worth should be carefully appraised. When it is of value the results are clear cut, and any intelligent physician will be able to perceive its worth. Then its technic of administration should be carefully studied before an attempt is made to apply it. An excellent example of a new method of treatment that is of great value is the use of liver in pernicious anemia; at the same time an excellent example of rashness of judgment is the unbridled use of liver in all forms of anemia.

Let each man study himself, therefore, so that he may know where he best fits into the scheme of things medical, and let him never forget that "experience is difficult and judgment fallacious." It is of just as much importance not to obstruct the march of medical progress as to abet it. Those who cannot take an active part in the advancement of medical knowledge must be sure they do not retard it.

PROGRAM, SOCIETY ACTIVITIES

Demonstration of Pathologic Specimens

The Program Committee of the Society announces that it plans to have a demonstration of pathologic specimens after each scientific meeting of the Society. These demonstrations are to be given by various groups of pathologists. Necropsy and operative specimens are to be shown, together with a brief consideration of the clinical features of the cases. It is hoped that all members of the Society will take advantage of these demonstrations to refresh and improve their knowledge of morbid anatomy.

TRANSACTIONS OF THE SOCIETY

Stated Meeting, November 2, 1932

The following were duly elected to membership:

Active Members

Isadore Meyer Alpher, 1474 Columbia Road, N. W.
Carleton William Bullard, 1726 Eye Street, N. W.
James Roger Costello, 900 Seventeenth Street, N. W.
Bernard Lauriston Hardin, Jr., 1835 Eye Street, N. W.
Eugene Stuart Lyddane, 3068 Que Street, N. W.
Edgar Elias Quayle, 1954 Columbia Road, N. W.

Associate Members

John Robert DeFarges, 1726 Eye Street, N. W.
Charles A. Goettling, Aldie, Virginia.
Archie Burton Hooton, Route 1, Benning, D. C.
Shelley Uriah Marietta, Walter Reed General Hospital
Luther Raymond Poust, Walter Reed General Hospital

Applicants for membership to be voted on in January, 1933:

For Active Membership

Robert Meston Bolton, George Washington University—1931
Roger Morrison Choisser, Rush Medical College—1917
Roger Stahel Cohen, George Washington University—1924
Edwin Stanton Crisp, Medical College of Virginia—1930
Samuel Mayer Dodek, Jefferson Medical College—1927
Richard Edgar Dunkley, Medical College of Virginia—1930
Samuel Luber, Rush Medical College—1929
John Galloway Lynn, University of Maryland—1929

Claudius Frank Mayer, Royal Hungarian University, Budapest—1925
William Carey Meloy, George Washington University—1928
Marion Thomas Rosser, University of Virginia—1925
Alma Jane Speer, George Washington University—1930
Charles Paul Waite, Georgetown University—1926

For Associate Membership

Valcoulon LeMoyne Ellicott, Johns Hopkins University—1920
Chester R. Smith, D.D.S., Georgetown University—1916

Resignations recently accepted:

Active Member

William J. Manning

Associate Members

John J. Kindred
Albert G. Love
Leartus J. Owen

Proposed Amendment to Article VIII, Section 2 of the By-laws to Be Voted on in January, 1933

Add the phrase, "except upon the written request of the patient or in the event of being required by law."

Section 2 would then read: "In certificates of illness concerning absence from official duties given to employees in the public service, or others, the disease shall not be specified, neither shall the name or nature of the disease be divulged by any written description or statement of symptoms, given to the patient, nor by any specification of the disorder, nor by any disclosure which may be construed as an evasion of the purpose of this regulation, *except upon the written request of the patient or in the event of being required by law.*"

ACTIVITIES OF SECTIONS

The Section on Internal Medicine, which holds its meetings on the fourth Friday of each month in the Medical Society Building, at 8 P. M., has arranged an interesting program for this year, with Dr. Stuart O. Foster as chairman. The first meeting was held October 28. The program:

1. "Some Clinical Phases of Medical Ophthalmoscopy," by Dr. James N. Greear, Jr., with discussion by Drs. Yater, Minor, Gager and Shepherd;

2. "Changes in Hemodynamics Under Physiological and Pathological Conditions as Shown by Means of the Injection Method," by W. F. Hamilton, Ph.D., Assistant Professor of Physiology, George Washington University Medical School; discussion by Drs. Esler, Roth, Gager, Leonard and Yater.

This section presents a program for the meeting of the Medical Society on November 16. Dr. Henry Jackson, Jr., of Boston, Massachusetts, will discuss "Agranulocytic Angina and Allied Conditions."

The Section on Neoplastic Diseases, Eugene R. Whitmore, Chairman, met at Georgetown University Hospital at 1 o'clock, October 15, 1932. The program:

1. "The Grading of Carcinomata with Treatment Indicated." Dr. V. J. Dardinski. The historical background of grading was outlined. A complete summary of Broder's classification, together with statistics covering a 5-year period of each one of the 4 grades was presented. The treatment indicated for the various grades was given.

2. "Nomenclature Used in Classification of Tumors." Dr. Lester Neuman. The classification of tumors, based on histological, regional and occupational background was outlined.

3. "The Radiation Therapy of Neoplastic Disease." Dr. Fred O. Coe. The various dosages in use of X-ray, radium, and radon were given, followed by a brief review of cases treated at Georgetown University Hospital, 1930 to date.

4. "Surgical Treatment of Neoplastic Diseases." Dr. George Tully Vaughan. "All malignancies are the same from the surgical standpoint. There is possibly a lower resistance to some factor which is of etiological significance in malignancy." The fact that acidosis and carcinoma do not co-exist, but that alkalosis seems to be present was brought out. The value of skin grafting following removal of cancerous tissue, as insuring a non-recurrence of the disease, was stressed.

An announcement was made by Major Cornell that the Washington Society of Pathology is to have Dr. J. C. Bloodgood and Dr. Charles

Geschickter with them at a meeting in the near future. About 80 members were in attendance.

The Section on Pathology and Laboratory Medicine met on the evening of October 14 at Gallinger Municipal Hospital. Dr. E. P. Swartz presented a paper on the Schilling count which included a summary of the histology and embryology of the blood cell formation. The doctor then presented the various leukemoid blood reactions together with the interpretations. Dr. H. H. Leffler followed with a short paper on the Schilling count in acute appendicitis in which cases of acute appendicitis were shown, some of which presented normal counts. The third paper, by Dr. Paul Dickens, was a presentation of hematology findings and an interpretation from the clinical viewpoint. A discussion of the various papers by Major Falise, Drs. Brilmyer, Schreiber, Alden and Dardinski concluded the program.

AMERICAN COLLEGE OF SURGEONS

The twenty-second Clinical Congress of the American College of Surgeons was held in St. Louis, Missouri, October 17–21, 1932, with headquarters at the Jefferson Hotel. About 2,000 surgeons registered. The evening scientific programs were diversified, dealing chiefly with surgery of the lungs, colon, early recognition of cancer and industrial surgery. Clinics, conferences and meetings for the public were well attended. The John B. Murphy oration in surgery was delivered by Sir William I. de Courcy Wheeler of Dublin, Ireland. The profession of St. Louis was responsible for an elaborate four-day clinic, and included a wide selection of operative and "dry" cases, as well as many laboratory demonstrations and discussions of an investigative nature. It was noted that the physical equipment of the hospitals is of a very high standard which is a silent index of the medical progress of the city. Those interested in hospital management and standardization had three full days to devote to the subiect. A special conference of teachers of surgery and surgical specialities was important and interesting in its relation to specialization. Papers by Doctors Zapffe, Cutler, Heuer, Whipple and Monroe were vigorously and frankly discussed. This conference will be continued at the next meeting of the College, when it is expected some concrete recommendations will be forthcoming. The Community Health Meeting (for the public) was held at St. Louis University Gymnasium and an adjacent hall. The attendance was 10,000 and as many more were denied admission for lack of space. This public interest in health matters was the source of enthusiastic comment on the activities of the College. Dr. J. Bentley Squire of New York was inducted into office as President, and Dr. William D. Haggard, Nashville, was chosen President-elect. The meeting of 1933 will be held in Chicago. Among those from Washington noted in attendance were Drs. R. U. Cooper, H. N. Dorman, J. J. Mundell, J. P. Shearer and Charles S. White.

At this convocation of the College of Surgeons, the following members of the Medical Society of the District of Columbia were inducted into Fellowship: Edward A. Cafritz, Harry Lee Claud, Alec Horwitz, N. Norman Smiler, Thomas C. Thompson and Arthur M. Zinkhan.

WASHINGTON AND BALTIMORE DERMATOLOGICAL SOCIETY

The annual dinner and first meeting of the Washington and Baltimore Dermatological Society, was held at the Washington Golf and Country Club on Thursday, October 18, with Dr. Lee McCarthy presiding. Plans for clinics and demonstrations throughout the ensuing year were discussed. All members of the Medical Society interested in dermatology and syphilology are invited to attend these meetings which are held on the fourth Thursday of alternate months at the Medical Society Building.

WASHINGTON HEART ASSOCIATION

The first meeting of the Washington Heart Association for this year was held on the night of November 14, in the auditorium of the Medical Society of the District of Columbia. Constitution and By-laws were adopted. The scientific program:

1. "The Etiological Factors in 1200 Cases of Heart Disease in Washington," by Dr. Leslie T. Gager and Dr. W. L. Dunn.
2. "The First Case of Acquired Heart Block on the Basis of a Congenital Anomaly," by Dr. Wallace M. Yater and Major Paul E. McNabb.

On December 14 the Washington Heart Association will present the program before the Medical Society of the District of Columbia. An out-of-town guest speaker will be heard.

NATIONAL INSTITUTE OF HEALTH STUDIES ON RHEUMATIC FEVER

Dr. O. F. Hedley of the National Institute of Health is making a bacteriologic study of rheumatic infections, such as rheumatic fever, chorea, and active rheumatic carditis. He will greatly appreciate the opportunity to obtain a small amount of blood for culture purposes from cases of these diseases. It is requested that those wishing to coöperate call West 0878, Branch 42, where Dr. Hedley or his assistant, Miss Rose, may be reached.

AUTOMOBILE OPERATORS' PERMITS

Physicians operating automobiles in the District of Columbia should know that a large number of operators' permits are now due for renewal. Application should be made immediately to the Department of Motor Vehicles for a renewal, should it be found on examining permit that the time for the permit is about to terminate.

REPRINTS

"The 'Original Morton Inhaler' for Ether," Annals of Medical History, Volume 4, No. 4, 1932, by George S. Roth, M.D.

"The Urinary Excretion of Phenolsulphonephthalein After Arsphenamine," American Journal of Syphilis, January, 1932, by George B. Roth, M.D.

"The Physicochemical Nature of the Arsphenamines and Their Decomposition," Medical Annals of the District of Columbia, June, 1932, by George B. Roth, M.D.

"A Study of Mesenteric Cysts, With a Report of Two Recent Cases," Annals of Surgery, September, 1932, by J. Ogle Warfield, Jr., M.D.

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"The Modern Conception and Treatment of Comitant Strabismus." Kentucky Medical Journal, August, 1932, by Wm. Thornwall Davis, M.D.

BUSINESS COMMUNICATION

Washington, D. C.
November 7, 1932

Medical Society of the District of Columbia,
1718 M Street, N. W.,
Washington, D. C.

Gentlemen:

Referring to the suit that you filed against Simpson Bros., Inc., trading as the Wakefield Dairy, for $75.00, as cost of advertising in the Bulletin, I wish to say that full payment was made by Simpson Bros., Inc., immediately after publication, for each of three advertisements totalling $75.00. Inasmuch as I had placed this advertising, these payments were made to me. Through oversight in my office, I failed to remit any of said payments to you. I am now making such remittance and hereby offer my apologies to you and to Simpson Bros., Inc. In justice to Simpson Bros., Inc., and in order that this letter may reach all of the members of your Society I ask that it be published in Medical Annals.

Very truly yours,
(Signed) GARDNER JOHNSON

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THE VALUE AND INDICATIONS OF INTRAVENOUS INJECTIONS IN INTERNAL MEDICINE*

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We usually think of intravenous treatment as being a recent addition to our armamentarium, but Keith, in a recent study of the subject, gives Richard Lower credit for a direct transfusion of blood in 1665, the blood being transfused from one animal directly into another. Within two years Denis of Paris performed a similar operation, blood from a sheep being transfused into a man without mishap. In 1831 and 1832 Latta of Scotland, during an epidemic of Asiatic cholera in Western Europe, introduced the practice of giving intravenous "saline" infusions to patients in severe collapse. Robert Boyle and Christopher Wren early realized the possibilities of intravenous medication, and injected drugs intravenously into experimental animals, a report of which was made in 1865. The discovery by Landsteiner in 1901 of iso-agglutinins in the blood and his division of the blood of human beings into groups on the basis of their contents of agglutinins, together with the demonstration by Agote in 1914, and Weil and Lewisohn independently in 1915, that sodium citrate could be used as an anti-coagulant in transfusions without toxic effects, put the intravenous administration of blood on a practical working basis. The intravenous injection of blood, sodium chloride and solutions of sugar became a frequent procedure, and intravenous medication, especially since the introduction of arsphenamine, has become even more common. Intravenous use of drugs is based on the fact that some of them have less therapeutic effect when given orally and that others, when injected into the skin or muscle, cause pain or even necrosis. However, there is little doubt that intravenous medication is used with unnecessary frequency, i.e., without any special indication, and not infrequently without any particular benefit to the patient. A modification of transfusion by the so-called exsanguination transfusion has been advocated as of benefit in some of the severe toxemias of childhood, particularly that associated with large superficial burns. Also, the use of hypertonic solutions of sodium chloride, sodium sulphate, or dextrose, given intravenously, has been shown to be of value in causing reduction of cerebral edema and intracranial pressure, as in tumor of the brain, injury to the head, meningitis, etc. Among the more common drugs given intravenously may be mentioned novasurol and salyrgan in the treatment of edema, some of the arsenical preparations, some of the dyes (such as gentian-violet, acriflavine, and acri-violet, which have been used with very problematical success in the treatment of blood stream infections), quinine, digitalis, and more recently, extract of liver in the treatment of pernicious anemia.

The transfusion of blood is indicated by Boyd and Richardson, and Keynes: (a) To restore the bulk of the circulating fluid; (b) to increase the coagulability; (c) to stimulate the hematopoietic organs; and (d) to increase the resistance to infection by the antitoxic and bactericidal properties of the transfused blood. Transfusion, therefore, has been found to be of benefit in hemorrhage, surgical shock, pre-operative cases with secondary anemia, hemorrhage of the newborn, illuminating-gas poisoning, chronic hemorrhagic diseases of the blood (hemophilia, purpura hemorrhagica, and jaundice), primary anemia and sepsis. In the chronic hemorrhagic diseases the value is only temporary and palliative. In pernicious anemia the transfused blood temporarily replaces the cells destroyed by the disease, but without other measures the anemia progresses to a fatal termination. The use of blood transfusion is somewhat affected by the reactions, at times quite serious, that occasionally occur, and no method has been successful in entirely avoiding such reactions, the percentage by different clinics and different methods varying from 9 per cent to 34 per cent. Various factors have been cited as operative in the causation of these reactions. For whole blood these are: Variation in the agglutinating ability of serums in different individuals of the same group; alteration in the chemical contents of the blood plasma in certain diseases; variations in the hydrogen-ion concentration between the blood of the donor and the recipient; the introduction of bacteria, pathogenic or not, at the time of the transfusion; the use of a method not permitting a rapid transference of the blood; the number of previous transfusions given the recipient; the possible presence of auto-agglutinins in cases of severe anemia or in patients receiving a number of transfusions over a short period of time; and any method permitting incipient coagulation changes. In the citrate method the factors mentioned as possibly producing reactions are: The lack of purity of the reagent; lack of freshly distilled water; inability of sodium citrate to stand repeated sterilization; allowing the blood to stand; exposure to air, causing a reduction in concentration; not washing the flask with the solution and with the balance being carefully dropped in; the use of new rubber tubing. Brines is mentioned as giving the contra-indications for blood transfusions to be nephritis, pulmonary edema and a damaged myocardium. It is always advisable when giving large transfusions to think of the possibility of acute dilatation of the heart.

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* Read before the Society, November 9, 1932, as one of a series of papers of a symposium on intravenous therapy. The discussions will all be published with the last paper.

It is estimated (Wildegans) that in every 1000 blood transfusions there are 1 or 2 fatalities, generally due to avoidable sources of error. The chief causes of death are the effects produced in the kidneys, liver, heart and blood vessels by the breaking down and disposal of the donor's blood. The mortality has been higher when the citrate method of transfusion was used.

Blood transfusion on an unconscious patient (Burwell) is always better delayed until consciousness returns because the patient is not able to give any indications of incompatability. It is always wise in any case to have a hypodermic of adrenalin prepared for use should untoward symptoms arise.

On the medical side (Keynes) transfusion is most frequently used for treating the various types of anemia. It is to be recalled that such transfusions are palliative, not curative. Perhaps the best results are obtained, not in primary anemias, but in obscure secondary anemias, in which the stimulation of a transfusion is enough to bring about recovery. It is useful following gastric or duodenal hemorrhage in which even though the patient is not likely to die from loss of blood, he is more quickly placed on the road to recovery by a transfusion. The improvement of the coagulability of the blood in hemophilia following transfusion is an accepted indication for such treatment. With regard to the use of citrate or whole blood, it would definitely appear that for the majority of operators, who are not called upon to perform a transfusion often, the citrate method is the one which requires the least practice or special knowledge. Field, commenting on this subject, states that there are several contra-indications to the use of the citrate method; for example, in certain blood dyscrasias the citrate method is at least theoretically contra-indicated because of its effect on the action of the blood platelets in the donated blood, and it almost completely destroys complement.

The amount of blood that may be given to infants (Goldsmith) is generally figured at 15 cc.

per pound of body weight as the upper limit, taking 20 to 40 seconds for each 20 cc. injected. For adults, 300 cc. to 500 cc. meet most indications.

Brown, in discussing the results of 342 transfusions in 178 cases of septic infection, feels that the methods by which transfusion acts to combat sepsis are in general, 3. These are: (1) By delivering to the patient some form of passive immunity which the donor's blood possesses; (2) by overcoming an associated anemia; (3) by affording general support through the food value of the transfused blood.

Polayes and Morrison call attention to the fact that blood transfusion as a method of treatment is probably being overdone. As a result of a study of 1500 blood transfusions in 1000 cases, they are somewhat skeptical about the universal value ascribed to the procedure. The transfusions in their study were all of whole blood. In these 1500 transfusions they conclude that the results were either of doubtful benefit or of no benefit whatever in 71.7 per cent. These results would lead one to question the judgment with which the cases for transfusion in this series were selected.

Glucose given intravenously undoubtedly has a much wider field than blood transfusion, and is indicated in the following medical conditions: impaired liver function, intestinal stasis, dehydration in children, certain cardiac conditions, increased intracranial pressure, pneumonia, collapse or fall in blood pressure, hemorrhage, uremia and impaired kidney function, toxemias of pregnancy, acidosis, and diabetic coma (with insulin).

Sprague and Camp have especially recommended the use of hypertonic glucose solutions in the treatment of cardiac diseases. The indications for such treatment they believe to be: (a) congestive heart failure not responding to other procedures; (b) diphtheritic myocarditis; (c) coronary thrombosis in which shock was the main feature; and (d) paroxysmal dyspnea. Fifty to 100 cc. of 50 per cent dextrose solution are given by large syringe at body temperature,. about six minutes being taken to inject 50 cc. Daily injections for several days to a week are recommended. Some arguments advanced against such therapy are: (1) Hypertonic glucose is irritating to the veins and has been used to produce sclerosis of varicose veins; (2) the hypertonicity of the solution produces a hydremic plethora, which by increasing the blood volume may disturb the circulatory balance; (3) solutions of glucose may produce symptoms of shock due to impure or improperly buffered solutions. The authors noted no change of importance in the blood pressure nor in the electrocardiogram.

Moore and Stewart report the disappearance of intraventricular heart block occurring in uremia, following the intravenous injection of hypertonic glucose solution, and White suggests its use in conjunction with other measures in cardiac asthma, congestive heart failure, and the cardiovascular complicatons of diphtheria.

Lynch and Webster, appreciating the value of glucose given intravenously in toxic heart conditions, and feeling that its value is not only that of a detoxifying agent but also a source of energy, have used it in the treatment of pneumonia. They feel that nutrition is supplied to the overtaxed heart muscle in the most readily assimilable form. Comparing this form of treatment with a series treated by digitalis, the authors found the mortality in the glucose group to be 18.1 per cent, while in the digitalis group it was 36.3 per cent. MacLachlan, Kastlin and Lynch have at first reported similarly gratifying results with a 22 per cent lower mortality in cases with positive blood culture, only to find that further study and experience did not support their conclusions.

The probable mode of action of the glucose in such cases is explained as being (Baum) due to its stimulating effect which may extend to the reticulo-endothelial system; to the restoring of the depleted supply of glycogen in liver and muscles (including the heart), the liver glycogen possibly being a prerequisite to that organ's detoxifying function; and to the general nutritive effect of the glucose.

The reactions following intravenous administration of glucose may be tremendously diminished by attention to the details of the preparation of the solution and its administration. Phifer emphasizes the necessity for these and discusses them. More recently he has thought it best to give glucose and salt separately, thus varying the amount of each with the demands of the case. The temperature of the solution should not be below 100°F., or above 110°F., and it should be given very slowly. He adds insulin only when sugar appears in the urine, and sodium bicarbonate only after there is definite evidence of acidosis persisting after the administration of glucose in normal salt.

Acidosis due largely to the end-products of fat metabolism not oxidized because of an insufficiency of carbohydrates is best treated by glucose and insulin intravenously (Lee). Glucose is more important here than alkalies.

Intravenous glucose has an established place in the treatment of complications of pregnancy. Together with pituitrin it is said (Hofbauer) to have the power of stimulating the bone marrow in the puerperal woman, with a resultant moderate leukocytosis and myeloid response. The action of the pituitrin here seems to be the production of a transient blockade of the reticulo-endothelial system, thus reinforcing and prolonging the action of the glucose. In the treatment of the toxemias of pregnancy, (McConnell) whether those early disturbances of metabolic origin, those of renal origin, or the later ones with increased blood pressure and perhaps eclamptic convulsions, glucose intravenously is of great value, acting as a supportive and detoxicant.

It is known (Althausen) that liver pathology, such as is found in subacute yellow atrophy, catarrhal jaundice, arsenical hepatitis, cirrhosis, syphilis, acute phosphorous poisoning, is benefited by glucose. Insulin has frequently been used with the glucose in the treatment of these conditions, but study of such therapy in experimentally damaged livers indicates that the already low glycogen content of the liver is still further decreased by the insulin and that the glucose alone should be given.

The continuous drop method of giving glucose would seem to have some advantages (larger quantities of nourishment and fluid, and less danger of overloading the circulation or assimilative process of the body), but has been reported by Friedrich and Buchaly as causing frequent venous thrombosis, even when only a 5 per cent solution of glucose was used.

Early in the use of glucose intravenously the question arose as to the strength of the solution that should be used and the decision regarding this has largely been based on clinical happenings rather than on any actual scientific investigation. Along with the strength of the solution there is to be considered, of course, the proper rate of its injection, which varies somewhat with the strength of the solution. Titus and Lightbody feel that, as an average, 25 per cent seems to be the most desirable strength, but they appreciate that individualization of the cases must aid in deciding the concentration of the solution to be injected; the proper rate of injection for an adult of average size should consume 30 to 35 minutes for each 15 grams of glucose. The therapeutic intravenous dose for an adult of average size they consider as 75 grams. Less than this will not give the maximum therapeutic effect, and more is likely to produce a reaction from over-stimulation of the insulin-producing activity of the patient's pancreas. In their opinion, single doses repeated from 1 to 3 times daily as necessary are preferable to the continuous intravenous injection for the same reason of excessive endogenous insulin production. Willems and McNealy did some experimental work using glucose solution of varying strength and fresh blood taken from the capillary circulation. They found laking of the red blood cells when concentrations of glucose below 3.5 per cent were used, while crenation appeared with 7 per cent. With higher concentrations of glucose, destruction of the red blood corpuscles was marked. Concentrations between 3.5 per cent and 6 per cent produced no observable change in the red blood cells. They concluded that a 5 per cent aqueous solution of glucose is the optimum concentration, and that strengths below

3.5 per cent and above 6 per cent are harmful. Later clinical experience does not support such conclusions.

Every clinician has experienced various degrees of reaction in some cases from the use of glucose intravenously, and fatalities have been reported. The reactions are manifested by chills, cyanosis, dyspnea, rise of temperature, sweating, rapid and weak pulse, and physical prostration. The reactions are attributed by Ylanan to (a) the use of impure glucose, (b) use of contaminated water as a solvent, (c) faulty preparation and sterilization, (d) administration of the glucose either in too weak a solution, too rapidly, or too cold. Stoddard states that the entire difficulty can be overcome by properly preparing the solution. Chemically pure glucose and properly distilled water, with exactness in autoclaving, with the solution freshly prepared and buffered just before using so that the final pH is close to 7.4, will almost entirely eliminate reactions.

Summary

1. Intravenous injections are not recent medical conceptions, but their practical use may be dated back to the stimulation of such procedures by the discovery of iso-agglutinins in the blood in 1901 and the anti-coagulant use of sodium citrate in 1914 and 1915.

2. Intravenous injections of all kinds are used more frequently than the rather definite indications for such procedures would require.

3. The reactions occurring with varying degrees of frequency following intravenous injections may be very greatly reduced by the careful observance of certain well defined rules in the preparation and mode of administration of the substance.

4. Whole blood is preferable to citrated blood for transfusion purposes, but for the inexperienced worker or one without proper assistants, citrated blood best meets the exigencies.

5. Glucose has the widest application of any intravenous medicament. The strength of the solution to be used is determined by the purpose for which it is to be given. Weak solutions are used when fluid is the main requirement; moderately strong solutions are used when nourishment is mainly desired; and strong solutions are used when the indication is the relief of edema and increased intracranial pressure.

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CORONARY OCCLUSION

A General Review

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The first case of coronary occlusion in which the clinical diagnosis was confirmed by autopsy was reported in 1878 by Hammer under the title, "Ein Fall von Thrombotischem Verschlusse einer der Kranz-arterien des Herzens." Two years later Weigert described the pathological changes which take place in the heart muscle after its blood supply is cut off by a thrombus or an embolus. The clinical symptoms of coronary occlusion were not distinguished from those of angina pectoris until 1896, when René Marie stated that he had observed symptoms in cases of myocardial infarction which did not conform to the anginal syndrome. He mentioned the sudden, violent onset of pain and dyspnea, the intensity and duration of the attack, and the ashen color of the face, "This syncope," he wrote, "is the clinical indication of the initial phenomenon: the arterial thrombus." After Herrick had published his article in 1912, entitled, "Clinical Features of Sudden Obstruction of the Coronary Arteries," the syndrome of coronary occlusion became more generally recognized. Herrick described the symptoms which are now familiar to all physicians: Pain, dyspnea, collapse, ashen color of the face, nausea, vomiting, cold perspiration and feeble pulsation of the heart. In 1919 he published a second article on coronary thrombosis. Since that time numerous cases of coronary occlusion have been reported, and valuable experimental work has been carried out by Smith, Wearn, Christian, Pardee, Wolff and White, Hamman, Willius and Barnes, Parkinson and Bedford, Levine, Conner and Holt, Priest, White and Bland, Sutton and Lueth, Meakins and Eakin, and others.

Etiology

The etiological factors of coronary occlusion are still obscure. Infectious diseases are apparently not a causative factor. Levine, who reported 145 cases, found that in only 3 of them had there been a previous history of rheumatic fever, and in these the attacks occurred 33, 49, and 60 years prior to death following coronary occlusion. Only 4.5 per cent of the patients in his series had syphilis. Of 200 cases reported by White and Bland, 3.5 per cent of the patients had syphilis; and of 287 cases reported by Conner and Holt, 14 per cent of the patients had either "proved or probable" syphilis.

A large number of patients having coronary thrombosis have a history of angina pectoris or arterial hypertension. One hundred twenty-five of the 200 patients in the series of White and Bland, and the great majority of the patients in Levine's cases had angina pectoris. Evidence of arterial hypertension antedating the attack of coronary thrombosis was found in 40 per cent of his cases, 34 per cent of Conner and Holt's, and 25 per cent of White and Bland's. Herrick is of the opinion that the primary lesion of coronary occlusion is arteriosclerosis or endarteritis, and that in the narrowed lumen of the thickened or atheromatous artery thrombi form. Pincoffs has expressed a similar opinion.

SEX AND AGE INCIDENCE

In White and Bland's 200, Levine's 145, and Priest's 60 cases of coronary thrombosis, there is an average of 4 males to 1 female. Wearn stated that 9 patients in 19 of his group were women. In 19 autopsied cases of coronary thrombosis reported by Wolff and White, 15 were males and 4 were females; in 4 cases of coronary embolism reported by them, 2 were males and 2 were females.

In White and Bland's, Levine's, and Priest's series the average age was 56 years; the age limits were 26 to 80 years, and the largest percentage of cases occurred between the ages of 40 and 60 years. Conner and Holt stated that among 287 case records of coronary thrombosis which they investigated there were no patients under 33 years of age at the time of the first attack. Smith and Bartels recently collected 21 cases of coronary occlusion proved at autopsy and 8 probable cases, in all of which the patients were less than 40 years of age. One case to which they referred was that reported by Benda of a girl, 13 years of age, who at autopsy was found to have obliteration of a coronary artery and infarction in the myocardium. In addition to the instances noted by Smith and Bartels, Vaquez reported finding a thrombus at autopsy in the left coronary artery of a young man, 18 years of age. Ramsay and Crumrine reported that a female infant, aged 4 months, was found at autopsy to have a thrombus occluding a coronary artery. Meakins and Eakin noted its occurrence in a woman in the thirties; Burnett, in a girl of 17; and Brooks, in a child of 13 years. In the present series the syndrome was observed in a woman 32 and a man 36 years of age.

SYMPTOMATOLOGY

Pain, one of the most striking symptoms of coronary occlusion is of sudden onset, is intense and agonizing, and lasts for hours or even days. The pain is usually in the substernal region, although it may be in the epigastrium. It may be localized or radiating. Pain is not, however, an invariable symptom. Clinicians who have observed numerous cases of coronary thrombosis comment upon the occasional absence of pain. Christian, who reviewed 70 cases of coronary thrombosis, found a small group of patients in his series who did not have pain but who had as their chief symptoms dyspnea, collapse and a sense of impending death. Wearn, McNee, Wolff and White, Hamman, Levine, Priest, and Sutton and Lueth noted that pain may not occur. Pain was absent in 32 per cent of the 34 cases of coronary occlusion studied by Meakins and Eakin and in 38 per cent of the 76 cases reviewed by Davis. There was no history of pain in 28 per cent of the 21 cases of coronary occlusion verified at autopsy, which were collected from the literature by Aubertin and Lereboullet. Davis has recently reported 5 cases of cardiac infarction in which there was no pain. The diagnosis in 3 of these cases was confirmed at autopsy.

Dyspnea is a prominent and fairly constant symptom of coronary occlusion. It is often extreme and prolonged; however, in cases of lesser gravity it may be slight and of short duration. Dyspnea sometimes marks the onset of an attack and it may then appear as a sudden breathlessness or "air-hunger." If pain is present the dyspnea may seem less pronounced because it is obscured by the intensity of the pain.

Shock is the third characteristic and important symptom, and its signs, such as ashen pallor, clammy skin and profuse perspiration, are always present in some degree. When shock is extreme there is collapse and unconsciousness.

Nausea and vomiting frequently occur, accompanied by distension of the abdomen and tenderness on palpation.

The radial pulse is usually feeble and small, and in some instances it is almost imperceptible. It may be slow, rapid, and arrhythmic.

Cardiac enlargement is present in about 80 per cent of the cases. The heart sounds may be feeble and indistinct. An arrhythmia, when it supervenes, is usually transitory. Auricular and ventricular premature beats are of rather common occurrence. Heart block occurs rarely. It has been observed in varying degrees, as early block, two-to-one, three-to-one, four-to-one, changing block, and complete dissociation of the auricles and ventricles. Levine reported 9 instances of partial block and 2 of complete block in his series of 145 cases of coronary thrombosis. Priest noted 10 instances of partial block and 1 of complete block in his series of 60 cases. Auricular fibrillation occurs frequently, but it is usually of short duration and may even escape detection. Auricular flutter occurs rarely. It was present only once in both Levine's and Priest's series. Ventricular tachycardia is a rare complication and may be followed by paroxysmal ventricular fibrillation and death.

The pericardial friction rub caused by the infarction following coronary occlusion is of special significance diagnostically. Unfortunately it is an inconstant finding. It is probably always present when there is an extensive infarction, but it may not be present during the first examination. The friction rub would not be heard even if it were present, provided the infarction occurred in the posterior portion of the heart, as it frequently does (Barnes and Ball). A friction rub occurred in only 9 of the 19 autopsied cases of coronary thrombosis and in but 2 of the 4 cases of coronary embolism studied post mortem and reported by Wolff and White.

The elevation of temperature and the leukocytosis which accompany infarction are doubtless caused by the absorption of necrotic tissue from the infarcted area. They are a fairly constant finding, the degree of increase being proportional to the extent of the infarction. Of 74 cases in which data were obtainable in Levine's series, all but 4 had a white cell count over 10,000, during the first week following the attack. The white cell count is generally under 20,000, though it occasionally goes as high as 30,000 per cubic centimeter of blood. The temperature may reach 102°F.

The fall in blood pressure which commonly occurs in coronary occlusion is of particular significance. Occasionally a patient with coronary thrombosis has a systolic blood pressure of 150 or 160, but even in these exceptional cases there may have been a drop in pressure from a previously higher rate of 200 or more which was not recorded. The systolic blood pressure may fall appreciably during the first 2 or 3 hours after the attack, or there may be no change until the following day. In cases of previous hypertension the drop in blood pressure is conspicuous, as it was in case 3 of this series. If the systolic blood pressure was normal before the attack the drop would be less striking but still considerable. The return to the individual's average systolic pressure is gradual. In some instances the previous height is not reached and a new level is established lower than that which prevailed before the attack.

Congestion of the lungs is frequently encountered, and in extreme cases acute pulmonary edema may develop. The liver likewise may become congested, and jaundice may appear.

Albumen and hyaline and granular casts are frequently present in the urine. The urinary flow may be lessened or even suppressed. Hamman observed a patient who had suppression of the urine for nearly 48 hours, and 3 others who had a diminished urinary output for 24 hours following coronary occlusion.

An examination of the reports of coronary occlusion found in the literature shows that at the onset of the attack patients often have had a sense of impending death. In an occasional case dimness of vision has been noted.

Although a diagnosis of cardiac infarction can usually be made on the basis of clinical signs alone, the electrocardiogram furnishes an additional means of diagnosis which is of considerable importance when the clinical symptoms simulate other acute conditions. The ventricular complexes of electrocardiograms studied in cases of coronary thrombosis often show characteristic changes. The first of these, which appears a few hours after the onset of the attack, is a deviation from normal of the R-T segment, frequently in the form of a high take-off of the T-wave, as pointed out by Pardee. This high take-off usually disappears by the third day after the attack. The T-wave also frequently becomes inverted in Lead I or III. Occasionally the inversion occurs in all three leads. As the infarction subsides there is usually a gradual return to the normal form. The T-wave may, however, continue to show inversion.

DIAGNOSIS

When a patient, particularly a man, 40 years of age or older, has a sudden onset of intense, prolonged, substernal or epigastric pain with evidences of extreme shock, accompanied by dyspnea, nausea, vomiting, elevation of temperature, leukocytosis, falling blood pressure, weak pulsations of the heart and pulmonary congestion, a diagnosis of coronary occlusion can be made with a good deal of certainty. If a pericardial friction rub suggesting infarction is present, and if electrocardiographic tracings show characteristic deviations in the R and T waves, coronary occlusion is in all probability present.

Reported cases have been referred to in the preceding discussion in which necropsy has demonstrated the occlusion of coronary arteries by thrombi or emboli with areas of infarction of the myocardium in children of both sexes and in patients whose symptoms did not conform to the typical syndrome.

The early symptoms of coronary occlusion are sometimes similar to an attack of angina pectoris. However, in coronary thrombosis the substernal or epigastric pain is localized and it is more severe, continuous and prolonged. Dyspnea, shock and prostration are more pronounced; and signs of infarction and congestion are likely to appear within a few hours.

In an occasional case of coronary occlusion intense epigastric pain accompanied by nausea, vomiting, abdominal rigidity and distension, and at times by hepatic enlargement and jaundice, simulates an acute surgical condition of the abdomen. Levine and Tranter reported 2 instances in each of which a differential diagnosis was made of an acute surgical condition. Pancreatitis, gall bladder disease or perforated gastric ulcer seemed present. One patient died suddenly during the administration of the anesthetic, and the other died without surgical treatment within 24 hours after admission to the hospital. Necropsy established the fact in both instances that an acute condition of the abdomen was not present, but that there was occlusion of a coronary artery accompanied by cardiac infarction. Faulkner, Marble and White reported 3 cases in which a diagnosis of cholelithiasis was made and coronary occlusion was proved to be the cause of death. One of these patients also died on the operating table. When a patient who has not had previous attacks of abdominal pain but who has had a history of hypertension is in profound shock with a sense of impending death, the possibility of coronary occlusion should be considered in making a diagnosis.

COURSE AND PROGNOSIS

The course which coronary occlusion pursues in individual cases depends largely upon the severity of the attack, the extent of myocardial damage from the thrombosis, and the complications which ensue. In mild cases, as when only a small coronary branch has been occluded and the area of infarction is small, the shock and prostration are usually not severe, and all the clinical symptoms disappear in from 3 to 10 days.

If, however, the area of infarction is extensive, the shock and prostration will be severe, and signs of congestive heart failure may develop. Congestive heart failure may be looked for particularly in cases in which the reserve capacity of the heart has already been considerably reduced. In these severe cases of coronary occlusion all the symptoms may slowly abate, and the patient may make a gradual or complete recovery extending over a period of several weeks or months. However, there may be recurrences of the coronary occlusion. In this event the heart may become progressively worse, and the patient may either die suddenly during an acute attack or slowly succumb to congestive heart failure. Should the patient make a clinical recovery he would carry with him throughout life a heart which shows a lack of response to effort and which consequently permanently curtails his physical activity.

Sudden death may occur within a few minutes, following the onset of an attack, provided there is a complete and sudden occlusion of either the right or left coronary artery. Ventricular fibrillation, complete heart block, and rupture of the heart in the thrombosed area may also precipitate sudden death during either the critical stage of the attack or the convalescent period.

In coronary occlusion the prognosis is favorable in only about 50 per cent of the cases which come under observation and treatment. Autopsy findings have established the fact that there are two groups of patients who have unrecognized coronary occlusion. The first group includes those who die suddenly following the onset of an initial or subsequent attack. A second group includes those patients whose symptoms following the occlusion of a minute coronary branch are so slight that either medical treatment is not sought or the symptoms are misinterpreted and a diagnosis such as acute indigestion is made.

Levine gave 53 per cent as the immediate mortality in his series of 143 patients of whom the end-results were known. Of the 67 who recovered, from the initial attack, the average duration of life was approximately 2 years. Forty-two were still living when the data were compiled. However, of the 20 patients whom Fulton saw in private practice, the entire mortality was 55 per cent, and the period of life in the fatal cases ranged from 2 hours to 4 years.

The prognosis is more favorable for a patient before the fifth decade of life, and he may be expected to recover more nearly completely than a person older in years. When the damage caused by coronary occlusion is slight, there is more likelihood of recovery and of the patient's activities being unimpaired than when the damage is extensive.

TREATMENT

Absolute rest in bed immediately following the onset of an attack of coronary occlusion is the most essential therapeutic measure. This method should be instituted in all probable cases because, if occlusion has occurred, rest may be an important factor in the patient's recovery. Rest in bed should be maintained for 6 to 8 weeks, depending upon the severity of the symptoms and the gravity of the complications. Normal activities may then be gradually resumed. However, in certain cases in which there is a continuance of an arrhythmia or in which extreme arterial hypertension persists, it is necessary permanently to curtail activities.

Large doses of morphine sulphate, administered subcutaneously, are required to relieve the pain. The application of heat is advisable to lessen the effect of shock. When cyanosis is pronounced and the breathing labored, the administration of oxygen is beneficial.

If a small branch of a coronary artery has been occluded, rest and morphine sulphate will be the only measures necessary, provided no complication has supervened. If, however, one of the large branches or a main artery has been occluded and the peripheral circulation becomes impaired, caffeine sodium benzoate is indicated. Digitalis, because of its ability to reduce the output of the heart in shock, is contra-indicated in the early treatment of coronary occlusion. However, the administration of digitalis is indicated if, and when, congestive heart failure develops.

In certain extreme cases in which there is a general collapse of the circulatory system, epinephrine (1 cc. of 1–1000 sol.) should be administered intramuscularly, followed by the intravenous injection of one ampule of strophanthin (gr. 1/100). The second administration of strophanthin should not be repeated until at least 8 hours have elapsed; following this, subsequent doses may be injected every 24 hours. Strophanthin, in contrast to digitalis, is an emergency drug because, as a rule, it produces an immediate cardiac response by stimulating the entire musculature of the heart.

Vasodilators, such as amyl nitrite and nitroglycerin, are contra-indicated in coronary thrombosis, and their administration should be withheld in doubtful cases until there is positive assurance that angina pectoris and not coronary occlusion is the disease to be treated.

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POLYCYTHEMIA RUBRA VERA*

Report of a Case Treated With X-ray

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Even before the history-making report of Vaquez in 1892, Vogel in 1854 demonstrated that the number of red cells in the blood was increased in certain conditions. However, Vaquez was the first to suggest that the condition was due to a primary hyperplasia of the erythroblastic bone marrow. His observations were confirmed by Widal in France in 1899. In 1903, Osler confirmed the previous findings and finally proved beyond doubt that the disease was a dyscrasia of the blood-forming organs.

Polycythemia has until very recently been thought to be a primary disease of the blood-forming organs. Recent writings, however, suggest that other factors, such as hypopituitarism or various and sundry causes associated with a definite syndrome, may be possible etiological factors. Minot feels certain that it bears a close relationship to the leukemias. He has reported several cases that, after having had polycythemia for many years, developed anemia with further enlargement of the spleen and finally a leukemic blood picture. In fact, both conditions may be looked upon as neoplasms of the hemopoietic tissues. The essential pathologic features, however, are redness and cyanosis resulting from an increase in the number of red cells. New microscopic methods have shown a slight widening of the vessels of the skin with mechanical destruction and increased viscosity of the blood. That the spleen does not play a leading part in the production of this condition is proved by the fact that splenectomy does not cure polycythemia, and it has even been known to begin after splenectomy.

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* Read before the Society, February 17, 1932.

This condition usually occurs in the fourth and fifth decades of life. Weakness, vertigo, headache and other signs of cerebral congestion are prominent symptoms. Redness of the palms of the hands is considered a characteristic feature. Local paralysis, paresthesias, hemianopsia and other disturbance of vision may occur. The abdomen is usually enlarged, corresponding to the degree of splenomegaly. History of hemorrhages from the nose, internal organs and skin is frequent. The blood changes are characterized by an increase in the red cells, eight, ten and thirteen million having been reported. The hemoglobin has gone as high as 200. A moderate leukocytosis, ten to twenty thousand, is the rule. The differential count is normal. The total volume of blood is increased and its oxygen content is raised. There is not much cardiac hypertrophy. The urine may be normal or contain urobilin.

The course is usually progressively downward, although a duration of from eight to nine years has been reported.

Inhalations of oxygen have been tried in an attempt to improve the oxygenation of the blood. Bleeding followed by the injection of saline is only of temporary benefit. Splenectomy does no good and in fact may do harm. Radium and X-ray have been used in some cases with benefit. Benzol has been found to benefit some cases temporarily and others over a long period of time. The most successful cases have been treated with either phenylhydrazine compounds or X-ray. One of the first to report treatment with phenylhydrazine compounds was Trevor Owens in 1925. It was used in 1918 also by Kloss with some success. Many subsequent observers have reported success with this drug. It is usually given in 0.3 gm. doses every other day orally. This is continued until the 4,000,000 mark is reached. Usually from eight to ten doses are required. If the patient can be seen at short and regular intervals it may be well to try phenylhydrazine, as the result is rapid. Otherwise X-ray is the treatment of choice, since the effect comes more slowly but is more lasting.

REPORT OF CASE

The patient, a white woman, aged 45 years, was first seen November 30, 1930. She complained of dizziness, headache and weakness. These symptoms had been present for about 4 months. Two days before consultation she noticed a swelling on the dorsum of the left wrist about the size of a pecan. It did not cause pain except on extension of the hand. Examination showed no discoloration and the mass was freely movable under the skin. While it was relatively hard and tense it had more of the feeling of a cyst under pressure. It apparently did not communicate with the joint. It was noticed during this examination that the palms of both hands were fiery red. Two days later a similar mass occurred on the dorsum of the right wrist. At this time large blue macules developed on the left thigh just above the knee. Similar spots appeared on the dorsum of both hands, just below the masses described above. *X*-ray films of the joints showed no evidence of fracture, dislocation or other abnormality of the joints. General physical examination showed a spleen that extended to the umbilicus. The remainder of the examination was essentially negative. Blood studies at this time showed the following characteristics:

Hemoglobin 96 per cent (Dare method).
Red cells 7,110,000 per cubic millimeter of blood.
Some anisocytosis and poikilocytosis.
No nucleated red cells.
White cells 11,200 per cubic millimeter of blood.
Polymorphonuclear neutrophiles 74 per cent.
Lymphocytes 21 per cent.
Platelets 410,000 per cubic millimeter of blood.
Coagulation time 4 minutes.
Bleeding time prolonged more than 15 minutes.
Blood sugar 83 mg. per 100 cubic centimeters of blood.

Non-protein nitrogen 36 mg. per 100 cubic centimeters of blood.

Smears from the gums showed abundance of Vincent's organisms. The blood Wassermann test was negative. Three months later, February, 1931, another check was made, and the erythrocytes were found to number 7,850,000 per cubic millimeter of blood. *X*-ray therapy was undertaken at this time with a dosage of 200 m.a. min. at 60 cm. with a filter of ½ mm. of copper and 1 mm. of aluminum over an area 50 cm. in diameter:

February 12, 1931, anterior spleen.
February 14, 1931, posterior spleen.
February 16, 1931, both anterior thighs.
February 17, 1931, both posterior thighs.
February 18, 1931, both anterior thighs.

Reaction to the treatment over the spleen was severe. It consisted of headache, nausea, vomiting, abdominal cramps and dizziness. The temperature rose to 100.2°F. with pulse rate of 114. The reaction lasted 6 hours. There was but little reaction to any exposure over the long bones. On March 9, 1931, the erythrocytes numbered 5,690,000 per cubic millimeter of blood. By this time the wrists were normal. The blue areas had disappeared from the thighs. Headache and dizziness were very slight, but the color of the palms of the hands remained the same. Another course of *X*-ray treatments was given with the same dosage:

April 2, 1931, anterior spleen.
April 3, 1931, lateral spleen.
April 4, 1931, posterior spleen.

Only moderate reactions followed exposures in this series. No count was done in April. The following course of *X*-ray treatments was given in May:

May 21, 1931, anterior femur.
May 22, 1931, anterior femur.
May 23, 1931, anterior femur.
May 27, 1931, anterior tibiae and fibulae.
May 28, 1931, anterior tibiae and fibulae.
May 29, 1931, anterior tibiae and fibulae.

Examination at this time showed the spleen about half the size as in February when treatment was begun. On May 24, 1931, the erythrocytes numbered 7,080,000 per cubic millimeter of blood. On June 19, 1931, they numbered 6,800,000, and on July 3, 1931, 6,560,000. The erythrocyte count on August 8, 1931, was 7,000,000, and on September 8, 1931, it was 9,000,000. It was then decided to give another course of x-ray treatments since symptoms of dizziness and depression with occasional headaches were returning. The spleen, however, was the same size as on the last examination, i.e., half the size observed on the first examination. The same technic was used.

October 30, 1931, anterior femur.
October 31, 1931, anterior femur.
November 1, 1931, anterior femur.

On November 12, 1931, the erythrocytes numbered 6,200,000 per cubic millimeter of blood, and on December 1, 1931, 5,300,000. On January 18, 1932, the count was 5,200,000. Examination in January showed the spleen to be just below the costal margin. No symptoms had been present since September, 1931, i.e., for 4 months since the last course of x-ray. By March 16 the red cell count had increased to 7,840,000. Another course of x-ray treatment was given with the same technic.

March 17, 1932, anterior femur.
March 18, 1932, anterior tibiae and fibulae.
March 19, 1932, posterior femur.

On March 28, 1932, the red cell count was 5,840,000; on April 27, 1932, 6,520,000; on June 15, 1932, 5,500,000; and on July 11, 1932, 4,040,000.

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SOME NOTES ON WILLIAM SHAKESPEARE'S KNOWLEDGE OF MEDICINE

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Authoritative medical historians, in general, concede William Harvey, an English physician (1573–1657), the honor of having been the first to discover the circulation of the blood in the human body. Harvey announced his discovery in 1628, although he states in his "Exercitatio-Anatomica de Motu Cordia et Sanguinis" that he had for nine years been demonstrating the subject in his lectures at the College of Physicians in London. If these statements are allowed, it would carry the first utterance of his discovery as far back as 1619. Sixteen years before that time, however, the play of *Hamlet* first appeared in print. In Act I, Sc. v, we find:

> ". . . . Holds such an enmity with blood of man
> That swift as quicksilver it courses through
> The natural gates and alleys of the body;
> And with a sudden vigor it doth posset (coagulate)
> And curd, like eager (acid) droppings into milk
> The thin and wholesome blood;"

This is indeed in anticipation of Harvey; and again one reads in *Julius Caesar* (Act II, Sc. i), published for the first time in 1623:

> "As dear to me as the ruddy drops
> That visit my sad heart."

Two lines from the speech of Menenius in *Coriolanus* give added confirmation of Shakespeare's knowledge of the circulation of the blood:

"I send it through the rivers of your blood,
Even to the court, the heart; to the seat of the brain;"

Of course, no claim is made that Shakespeare was the first to realize that blood flowed. It is well known that Hippocrates, Columbus and Servetus had touched on the subject in their observations and teachings, but it is most illuminating that before an experimental study of the circulation of the blood was given widespread recognition, Shakespeare should have definitely asserted himself on that score.

Until John R. Young in 1803 and William Beaumont in 1833 demonstrated the actual physiology and chemistry of digestion, the stomach was regarded as a "mill, a fermenting vat or a stewpan." Physicians referred to digestion with vague theories of "innate heat" and "vital spirits" and little was actually known of the mechanism by which foods were reduced to assimilable units and utilized in various ways by the body. Shakespeare knew little, if any, more than his contemporaries or the men of the pre-Beaumont era regarding this vastly important subject, but one cannot help but be struck by the conversation in *Coriolanus* (Act I, Sc. i) between Menenius and the Second Citizen, quoted in part below. Here, with "belly" meaning gastrointestinal tract, one finds a startling, significant statement regarding digestion and nutrition. One must admit that the master strongly suspected the intestines to have the function they do in these bodily processes, and the blood to be the distributing agent.

Menenius:
There was a time when all the body's members
Rebell'd against the belly, thus accus'd it:
That only like a gulf did it remain
I' the midst o' the body, idle and unactive,
Still cupboarding the viand, never bearing
Like labour with the rest,—when the other instruments
Did see and hear, devise, instruct, walk, feel,
And, mutually participate, did minister
Unto the appetite and affection common
Of the whole body. The belly answer'd—

First Citizen:
Well, sir, what answer made the belly?

....

Menenius:
Note me this, good fellow;
Your most grave belly was deliberate,
Not rash like his accusers, and thus answer'd:
'True it is, my incorporate friends', quoth he,
'That I receive the general food at first
'Which you do live upon, and fit it is,
'Because I am the store-house, and the shop
'Of the whole body; But if you do remember
'I send it through the rivers of your blood,
'Even to the court, the heart; to the seat of the brain;
'And through the cranks and offices of man,
'The smallest nerves and the small inferior veins
'From me receive the natural competency
'Whereby they live; and though that all at once
'You my good friends' .... this says the belly, mark me,—

....

'.... Though all at once cannot
'See what I do deliver out to each,
'Yet can I make my audit up, that all
'From me do back receive the flour of all,
'And leave me but the bran.'

Galen (131–201 A.D.), one of the greatest of Greek physicians after Hippocrates, was the founder of experimental physiology. At the close of the so-called ancient period in the history of medicine, he had contributed scores of volumes upon pathology, therapeutics and physiology. Remarkable as these works were in the slow progress of medicine at that time, they were filled with many inaccuracies. They were based upon the dissection of swine and apes, and his physiologic speculations about his findings were ruined by his mania of teleology. In spite of this, however, Galen was a final authority in all medicine and after his death European medicine remained at a dead level for nearly fourteen centuries. It was not until Andreas Vesalius, a physician of German extraction, published his "De Fabrica Humani Corporis" (1534), that Galenical tradition was thrown overboard.

The best feature of Galen's anatomical and physiological work was in the field of neurology, and much that he described is still accepted. Shakespeare was familiar with these findings and even with later discoveries of the physiology of the brain. In *Twelfth Night* (Act I, Sc. v), for instance, reference is made to the 'pia mater.'

The Clown declares to Olivia, ". . . .one of thy kin has a most weak pia mater." It was a belief then, and it is known today, that through the pia mater, the innermost and most vascular covering of the brain and the spinal cord, these latter neural tissues are nourished. Hence, to have a weak pia mater was to have a weak intellect.

There was an ancient theory that there were only three ventricles in the brain; in the first, one had the origin of the "five wits" or special senses; in the second, thought; and in the third, memory. In *Love's Labour Lost* (Act IV, Sc. ii) we read:

> *Holofernes:* This is a gift that I have, simple, simple; a foolish, extravagant spirit, full of forms, figures, shapes, objects, ideas, apprehensions, motions, revolutions; these are begot in the ventricles of memory, nourished in the womb of pia mater, and delivered upon the mellowing of occasion.

Shakespeare apparently had opinions regarding the abuse of alcohol and over-indulgence, and he has Adam deliver a short temperance lecture in *As You Like It* (Act II, Sc. ii):

> *Adam:*
> Though I look old, yet I am strong and lusty;
> For in my youth I never did apply
> Hot and rebellious liquor in my blood,
> Nor did not with unbashful forehead woo
> The means of weakness and debility;
> Therefore my age is as a lusty winter,
> Frosty, but kindly.

The physician and the student of psychology or medicine who are familiar with the eccentricities of man, historically and clinically, will note with interest Shakespeare's reference in the *Merchant of Venice* (Act IV, Sc. i):

> *Shylock:*
> Some men are there love not a gaping pig;
> Some, that are mad, if they behold a cat;
> And others when the bagpipe sings i' the nose,
> Cannot contain their urine; for affection,
> Master of the passions, sways it to a mood
> Or what it likes or loathes.
>
> . . . .
>
> And there is no firm reason to be render'd
> Why he cannot abide a gaping pig,
> Why he a harmless necessary cat,
> Why he a woolen bagpipe, but of force
> Must yield to such inevitable shame,
> As to offend, himself being offended.

Many authors recently, in technical and popular works have stressed the relative merits of marriage and celibacy. Freud has pointed out the results of repression; Ludovici stresses the important rôle of parturition; Meagher discusses the masturbatory phases; *Juanita Tanner* dissects the subject philosophically and then sentimentally; Katherine Bement Davis has collected an invaluable series of statistical tables and data and leaves you to your own conclusions with the "confessions" of twenty-two hundred women; and Judge Ben Lindsey seeks a solution. I believe that Shakespeare was inclined to favor marriage, perfect love and enduring attachment as against celibacy, particularly for women. His portrayals of Rosalind, Ophelia, Desdemona, Viola, Olivia, and Juliet as women "to whom men can bear eternal allegiance" bear out this conception, as well as this speech in *Midsummer Night's Dream,* (Act I, Sc. i):

> *Theseus:*
> Therefore, fair Hermia, question your desire;
> Know of your youth, examine well your blood,
> Whether, if you yield not to your father's choice,
> You can endure the livery of a nun.
> For aye to be in shady cloister mew'd
> To live a barren sister all your life,
> Chanting faint hymns to the cold fruitless moon,
> Thrice blessed they that master their blood,
> To undergo such maiden pilgrimage;
> But earthlier happy is the rose distill'd,
> Than that which, withering on the virgin thorn,
> Grown, lives and dies in single blessedness.

Of special interest to the writer are the following excerpts and passages which have some bearing upon the field of obstetrics.

From Sc. ii, Act V, of *Love's Labour Lost* we find a reference to "quickening" or the movements of the fetus in utero. Here Costard says: "Faith, unless you play the honest Troyan, the poor wench is cast away: she's quick, the child brags in her belly already; 'tis yours.'

One does not find a reference to the ancient as well as present day belief in prenatal influences, but the following from Third Part of *Henry Sixth* (Act IV, Sc. iv) is a conception that the emotions may be powerful enough to cause the death of an unborn child:

Queen Elizabeth:
And I the rather wean me from despair
For the love of Edward's offspring in my womb.
This is it that makes me bridle passion,
And bear with mildness my misfortun's cross;
Ay, ay, for this I draw in many a tear
And stop the rising of blood-sucking sighs,
Lest with my sighs or tears I blast or drown
King Edward's fruit, true heir to the English crown.

One clearly reads a reference to the sufferings of childbirth and the kindliness of men during this time, in the following lines from *King Henry Eighth* (Act. V, Sc. i):

King Henry:
Now, Lovell, from the Queen what is the news?
Lovell:
I could not personally deliver to her what you commanded me; but by her woman
I sent your message, who returned her thanks
In the great'st humbleness, and desired your highness
Most heartily pray for her.
King Henry:
What say'st thou, ha?
To pray for her? What, is she crying out?
Lovell:
So said her woman, and that her sufferance made
Almost each pang a death.
King Henry:
Alas, good lady!
Suffolk:
God safely quit her of her burthen and
With gentle travail, to the gladding of
Your Highness with an heir.

And from *Pericles* (Act III, Sc. i):

Pericles:
Lucina, O
Divinest patroness, and gentle midwife,
To those that cry at night, convey they diety
Aboard our dancing boat; make swift the pangs
Of my Queen's travils!

(It may be remembered that Pericles was accompanied by his Queen in a voyage during which a most severe storm overtook them. Through fear and the effect of the "dancing boat" the queen who was with child was prematurely delivered of a baby girl. She expired and was consigned to the deep by Pericles to appease the entreaties of his superstitious mariners.

Several passages which well describe fetal malformations run through these works. For instance, in *King Richard Third* (Act I, Sc. i), Richard, Duke of Gloucester, says:

"I, that am curtail'd of this fair proportion,
Cheated of feature by dissenting nature,
Deform'd, unfinish'd, sent before my time
Into this breathing world, scarce half made up,
And that so lamely and unfashionable
That dogs bark at me, as I halt by them. . . . ."

In Part Third, *King Henry Sixth* (Act III, Sc. ii), Gloucester says:

"Why, love forswore me in my mother's womb;
And, for I should not deal in her soft laws,
She did corrupt frail nature with some bribe
To shrink mine arm up like a wither'd shrub;
To make an envious mountain on my back,
Where sits deformity to mock my body;
To shape my legs of an unequal size;
To disproportion me in every part,
Like to a chaos, or an unlick'd bear-whelp
That carries no impression like the dam."

It is interesting to note Shakespeare's reference to the birth of children whose teeth have already erupted. Part Third, *King Henry Sixth* (Act V, Sc. vi):

King Henry:
Thy mother felt more than a mother's pain,
And yet brought forth less than a mother's hope,
To wit, an indigested and deformed lump,
Not like the fruit of such a goodly tree.
Teeth had'st thou in thy head when thou wast born,
To signify thou camest to bite the world; . . . .

In the same scene Gloucester himself says:

"For I have often heard my mother say
I came into the world with my legs forward.
Had I not reason, think ye, to make hast,
And seek their ruin that usurp'd our right?
The midwife wonder'd; and the women cried,
'O, Jesus bless us, he is born with teeth!' "

As to Cesarian section we learn that:

". . . . Macduff was from his mother's womb
Untimely ripp'd."

And from *Cymbeline* (Act IV, Sc. iv):

Mother:
Lucina lent me not her aid,
But took me in my throes;
That from me was Posthumus ript,
Came crying 'mongst his foes
A thing of pity!

A nice distinction is brought out in *King John* (Act I, Sc. ii) between illegitimacy and premature birth, as one will see in:

Robert:

Upon his death-bed he by will bequeath'd
His lands to me, and took it on his death
That this my mother's son was none of his;
And if it were, he came into the world
Full fourteen weeks before the course of time.

. . . .

Shakespeare was mentally the master of all time. Within his grasp one finds a knowledge of law, theology, astronomy, mathematics, literature and medicine. One wonders how one human being could possibly have mastered such a wealth of information; have produced such eternal masterpieces; have necessarily associated with so many classes and types of people, in a single lifetime. He is said to have studied law, and he was indeed a close student of theology, and an academician. If other evidences of Shakespeare's right to membership in the Guild of Medicine were wanting, his references to the brain and to the physiological functions of digestion and assimilation would be amply sufficient.

N. B.: These notes are written in full acknowledgement of a monograph published by John W. Wainwright in 1907. The lines from Shakespeare's plays are taken from the "Complete Works of William Shakespeare; Cambridge Text," Published by Dana Estes & Co., Boston Massachusetts, Ten Vols.

Science Series. No. 11

DYSPNEA AND SOME MECHANISMS OF RESPIRATORY REGULATION

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The regulation of the respiration is a problem which has taxed physiologists for many decades and which is now, in some of its details, buried in controversy. Some of the salient mechanisms, however, are beginning to emerge into clear light and bid fair to be of use to the clinician in understanding physiological responses (symptoms) of his patients.

It was early learned (Boyle) that air is necessary for life, and that a substance which we now recognize as oxygen enables the body to do work and produce heat (Mayow). Artificial respiration was performed by Hooke and the ancient supposition that pulmonary movements were the essentials of respiration was laid at rest.

These seventeenth century observations might be likened to a flash in the pan, since they were lost track of in the development of scientific thought for a period of 200 years. Mayow clearly anticipated Lavoisier in the description of oxygen and went even further than the brilliant Frenchman in that he recognized the dependence of work as well as heat upon oxidations, a concept that did not become "scientific" until the promulgation of the second law of thermodynamics in 1845 (Mayer).

The problems of metabolism in general and of respiratory regulation became distinct in the minds of the investigators of the last half of the nineteenth century. It was recognized that the needs of the body for oxygen and the necessity for removing carbon dioxide were served in such a way as to keep the "milieu intéieur" quite constant in respect to the tensions of these gases (Bernard, Bert), but the details of the mechanisms by which these needs were met, how they work physiologically and how they go wrong pathologically, is a story that was not told until later. It is, of course, still in the telling.

The respiratory center had been localized (Legallois) and its control by both nervous and chemical means postulated. It was well known that stimulation of the vagus centrally would produce apnea, and that this so-called vagus apnea could be produced by either distention or collapse of the lungs. It could be shown (Geppert and Zuntz) that violent exercise reduced the carbon dioxide in the blood and increased the oxygen beyond the normal limits. These mechanisms seemed to regulate away from the normal rather than toward it, and served to obscure rather than clarify the problem.

On the other hand, the classical experiments of Fredericq showed that respiration was regulated chemically in a rational manner. He led the blood from the carotid artery of one dog through the head of another and back again to the first. He showed that when the first dog was asphyxiated, the second became dyspneic; also, that when the first dog was over-ventilated, the second dog became apneic. It had further been shown that a slight excess of carbon dioxide in the inspired air would stimulate respiration, while a similar reduction of oxygen had no such effect (Meischner).

The stage was thus laid in conflicting theory and observation for the clarifying touch of a great physiologist. This function was performed by Haldane, whose broad biological viewpoint enabled him to evolve an account of the controlling mechanisms of respiration which fit the phenomena as they were then known, and which has served with few modifications to the present time.

Haldane and Priestley worked out the technic of taking a sample of alveolar air and showed that it was in virtual equilibrium with the arterial blood. As a result of this work it soon developed that respiration was so controlled that the tension of carbon dioxide in the alveoli and hence in the arterial blood was under ordinary conditions quite constant. It was soon seen that the regulation was not in terms of carbon dioxide tension, but rather in terms of the hydrogen-ion concentration of the blood, because the blood bicarbonate could be reduced or increased by dietary control or physiological administration of acid-producing drugs and the carbon dioxide tension in alveoli and arteries was seen to follow these changes in just such a fashion as to keep the blood alkalinity normal.

That this mechanism might be deranged so as to produce dyspnea can be shown experimentally by causing a subject to breathe 7–10 per cent carbon dioxide. The breathing becomes extraordinarily labored and heavy. Now it is difficult to imagine a non-experimental condition in which escape of carbon dioxide is interfered with and still oxygen can get to the blood. It is usual for the oxygen pathway to be stopped when the egress of carbon dioxide is interfered with, and hence except as a result of experiment a carbon dioxide dyspnea is indeed a rarity.

Haldane and his co-workers recognized another mechanism by which respiration was controlled, namely, lack of oxygen. This mechanism is much less sensitive than the carbon dioxide mechanism and can rightfully be regarded as an emergency mechanism, one which does not operate except under most abnormal circumstances. Thus, it is observed in the laboratory that when a subject breathes air whose oxygen tension is reduced to two-thirds atmospheric, respiration is regulated and controlled so as to keep the alveolar carbon dioxide normal, even though the alveolar oxygen is decidedly below normal. As the alveolar oxygen is reduced still further, a level is finally reached at which this factor takes over the control of respiration and may stimulate it to such a degree that carbon dioxide is blown off from the blood and the blood may even become abnormally alkaline. The mechanism of this respiratory stimulation is said by Gesell to involve the fact that acid metabolites, primarily lactic acid, are produced by the respiratory center. When these fail to be oxidized, they accumulate in the respiratory center and stimulate it by increase in local hydrogen-ion concentration.

It is a very interesting fact that when this mechanism is in control of the respiratory activities, the regulation is much less even and constant than it is normally. Thus, after a period of forced breathing the carbon dioxide is blown out of the blood, and since the blood can store this gas in large amounts it is not replenished for some time.

During this time there is at first apnea, followed by cyanosis. As the cyanosis increases a few spasmotic breaths are drawn, and the cyanosis disappears. These spasmotic phases of periodic breathing are repeated until the carbon dioxide is replenished and breathing is resumed, steadily, under normal control. Evidently, when oxygen-want controls respiration, breathing is irregular as contrasted with its normal regularity when controlled by carbon dioxide. It is as though we compared the jerky behavior of an engine with a small fly-wheel and an insensitive governor to a smoothly running engine with a large fly-wheel and a good governor.

Now, if there is an experimental obstruction to breathing, so that in the normal individual respirations become shallow and labored, or if, as a result of pathological causes a similar result supervenes, oxygen-want and consequent irregular breathing appear. This is because of certain interesting anatomical relationships which are consequent upon shallow breathing. It has been shown by Keith that when the chest expands but slightly only the alveoli near the chest wall are operating. The rapidity of breathing causes these alveoli to be over-ventilated. The blood in the left heart is then a mixture of blood from the over-ventilated superficial and the under-ventilated deep alveoli. From the carbon dioxide and oxygen dissociation curves of blood it is easily seen that the over-ventilated blood is normal in oxygen and deficient in carbon dioxide, whereas the under-ventilated blood is deficient in oxygen and contains an excess of carbon dioxide. The proportions are often such that the mixed blood is both anoxemic (deficient in oxygen) and acapnic (deficient in carbon dioxide). The result of this vicious circle in the normal is breathing which simulates clinical periodic breathing of the Cheyne-Stokes type, and there is every reason to believe that the above outlined causes enter into the antecedents of the purely clinical types. Other causes may also play a rôle, such as sclerosis or spasm of the bulbar arterioles and the somatic and circulatory reflexes which we shall consider later.

Anoxic dyspnea, i.e., dyspnea of the general type we have just discussed, may be increased by systemic and circulatory reflexes, and by such factors as anesthesia and pain. The most serious consequence of this type of dyspnea is acapnia (loss of carbon dioxide). According to Henderson acapnia entails a series of untoward results. The oxygen transport by hemoglobin is interfered with and a vicious circle is started which intensifies the acapnia through increased breathing. The tone of skeletal muscle is reduced and the muscles press less firmly upon the veins. The blood in consequence stagnates there and the cardiac output is lessened. This again stimulates breathing (anoxic mechanism) and increases the acapnia. The inspiratory muscles participate in the general loss of skeletal muscle tone, the chest collapses so that the lungs contain, on the average, much less air than normal. This predisposes to atelectasis and pneumonia.

According to Henderson, it is due to the fact that strychnine increases skeletal tone and hence venous return, that this drug has its tenacious hold as a "heart stimulant."

The logical remedy for acapnia is, of course, the administration of carbon dioxide to replace that which has been blown off during the dyspnea, and the clinical results of this measure bid fair to make it standard practice in the prevention of postoperative respiratory complications as well as in the treatment of carbon monoxide poisoning.

We have seen that excess of carbon dioxide may lead to experimental dyspnea and that anoxemia may lead to experimental dyspnea which approaches certain clinical types and which results in acapnia. The next type of dyspnea which is to be discussed is the asphyxial, in which there is a retention of carbon dioxide as well as lack of oxygen. This may be produced experimentally by the rebreathing of air which allows the oxygen to go down as the carbon dioxide to accumulate. Clinically it is seen in war-gas poisoning and asthma, and is in general due to a failure of air to ventilate the lungs or to the production of a barrier for diffusion between air and blood in the lungs.

It is interesting to recognize that in asphyxial dyspnea cyanosis is apt to be more in evidence than in simple anoxic dyspnea. This is because in asphyxial dyspnea the carbon dioxide accumulates and at a given oxygen tension causes the hemoglobin to release more oxygen than it does when the carbon dioxide has not accumulated (anoxic dyspnea). Since the blueness of the blood is directly proportional to its oxygen unsaturation, the cause for difference in the degree of cyanosis is apparent.

Besides these mechanisms which regulate respiration in accordance with some probable or actually measurable change in the chemistry of the respiratory center or in that of the blood, there are others which do so in a purely nervous fashion. These mechanisms are apparently prepotent in that they serve the finer regulation and may even displace temporarily the chemical regulation.

The longest known of these mechanisms is that described by Hering and Breuer, in which the vagus acts as a sort of coördinating proprioceptive nerve governing respiration in somewhat the same fashion that the fibers passing up the dorsal bundles govern skeletal movements. When the vagi are cut, respiration becomes slow, irregular and ataxic. Two kinds of receptors are recognized. One is stimulated when the lungs collapse, and it is so connected as to cause the stoppage of expiration and initiate inspiration. The other receptors are stimulated when the alveoli are expanded and have the opposite effect.

Haldane believes that the over-activity of these Hering-Breuer reflexes explains the respiration in certain cases of neurotic dyspnea, cases that were particularly common among shell-shocked patients after the war. Here the respirations are unduly shallow because the Hering-Breuer reflexes take hold too early in the respiratory cycle and stop both inspiration and expiration too soon. The consequences of shallow breathing supervene, with anoxemia and cardiovascular and respiratory distress.

One fact which was first observed by Geppert and Zuntz and which has been amply confirmed by later workers has been a great puzzle to modern physiologists. When a normal individual exercises moderately, there is increase in breathing. The increase occurs even though the alveolar carbon dioxide is lower and oxygen higher than normal. This at once casts doubt upon the prepotence of chemical regulation of respiration in exercise, but in spite of the work of Geppert and Zuntz certain physiologists sought room for chemical regulation in the hypothesis that the blood passed through the lungs too rapidly to become completely aerated in spite of the well ventilated alveoli. The early findings that exercise increased the degree of aeration of the arterial blood were confirmed (Hering and Breuer), and those who upheld the omnipotence of chemical regulation were forced to the position that blood flow through the respiratory center was so decreased that the center itself was stimulated by accumulation of acid.

Proof of this notion would be found in analysis of the blood draining the respiratory center. Since such blood is not available, the next best thing is blood draining the brain, i.e., that of the internal jugular vein. When this blood of exercising subjects was analyzed it was not found to increase in carbon dioxide nor to be less in oxygen or hydrogen-ion concentration than similar blood from the subjects resting (Cullen and co-workers).

An early suggestion (Krogh and Lindhard) as to the cause of increased respiration, in excess of the chemical demands during exercise was that the respiratory center is bombarded by impulses over collaterals from the motor tracts. That such a mechanism operates is more than possible, but another mechanism has been suggested (Krogh and Lindhard), namely proprioceptive impulses passing in the opposite direction. This mechanism has recently been established (Harrison, Calhoun and Harrison), for passive movements of the legs cause a marked rise in respiratory rate even if the blood drainage is excluded from the general circulation (amputation without cutting nerves). Respiration is slightly or not at all stimulated by passive movements if the cord is transected or if the nerve supply to the limb is cut, even though the blood supply is left intact.

These mechanisms will explain the excess ventilation of the blood in the normal individual during exercise, but will not account for the fact that in heart disease (congestive failure) the same situation applies, but with greater dyspnea. In mild cases of congestive failure the resting respiration is somewhat increased and, of course, dyspnea upon even slight exertion becomes extreme. Analysis of the alveolar air shows that the alveoli are well ventilated (Barr and Peters, Beddard and Pembry) and analysis of the arterial blood shows that it is well aerated (Eppinger and co-workers, Fraser and co-workers). Furthermore, analysis of the blood of the internal jugular vein indicates that blood flow through the brain is such as to cause gas tensions in this organ to be within normal limits during mild exercise as well as before and after the exertion (Cullen and co-workers). Such changes as do occur are often apparently the result of respiratory stimulation rather than its cause.

This raises very acutely the question, since chemical factors are insufficient to explain the increased breathing in heart disease, what its cause can be, and why it is that exercise which produces no effect upon the blood gases will none-the-less provide conditions for a severe dyspneic paroxysm.

The systemic reflexes which we have discussed show how the respiration may increase, but not why it increases so markedly in the cardiac. The key to this problem was found through the keen insight of Harrison and his collaborators in Nashville (Harrison, Harrison and Marsh). One of the most constant accompaniments of cardiac dyspnea is an increased venous pressure. Bainbridge has shown that reflexes from the right auricle and roots of the great veins accelerate the heart. The Vanderbilt workers showed that distention of the right auricle by a balloon or by infusing fluid rapidly also serves to increase respiration to a very marked degree, and they believe that it is the increased venous pressure acting upon the respiratory center through the vagus that is responsible for the excess of respiration in the cardiac patient as compared to the normal. Of course, in severe failure, anoxic or even asphyxial factors may contribute to the dyspnea.

The counterpart of this mechanism is seen in the activity of the carotid bulb (Heymans). An increase in arterial pressure activates an afferent path from the carotid sinus which inhibits respiration. It is also maintained that receptors in this locality cause respiratory changes in response to variations in the oxygen saturation and hydrogen-ion concentration of the arterial blood. How important these reflexes are in the ordinary economy of the unanesthetized animal is not established (Cromer).

If the ventilation of the cardiac patient is measured, it is found that he respires, in liters per minute, an amount of air that is disproportionately small as compared to the degree of distress which he evidences (an amount which a normal subject can handle with no distress at all). He is not only stimulated very easily to excess breathing, but also he is handicapped in his breathing by factors which will bear further analysis.

It is recognized that the left heart is the one that is usually handicapped in heart disease. This necessitates a compensatory dilatation of the left heart to be brought about only by an increased pressure during filling. Since the increased pressure during filling is transmitted from right heart to left heart through the lungs, it involves a congestion of the pulmonary capillaries. This amount of blood that is backed up into the lungs has been measured in normal subjects and patients with heart disease (Hamilton and co-workers). It has been shown to bear a rough inverse proportionally to the vital capacity, which is always reduced in congestive failure. There is only so much space in the chest, and if a large part of this space is occupied by blood (the residual air is seemingly unchanged), the space for air is correspondingly reduced.

Since congestive failure thus reduces the vital capacity and increases the respiration, the result is respiratory distress, for if the breathing is more than a certain fraction of the maximum ventilation (Harrison and co-workers, Calhoun and co-workers) the subject feels "short of breath." The distress supervenes earlier in an increasing series of exercises the more severely diseased the cardiovascular system may be, and it is possible by measurements of ventilation and vital capacity during graded exercise to differentiate cardiac dyspnea from the dyspnea of "cardiac neurosis."

It has been known for many years that when a patient lies down, his vital capacity decreases.

The mechanism of this decrease has been much argued over, but has recently been shown (Hamilton and Morgan) to be related to the mechanism just outlined, because when blood is trapped in the extremities by tourniquets the postural change in vital capacity disappears. This shows that normally the lungs act as blood depots, emergency reserves perhaps, but that in so doing their respiratory capacity is encroached upon.

The dyspnea of recumbency (orthopnea) is a similar phenomenon and involves an increased pulmonary congestion, reduced vital capacity, increased breathing from raised venous pressure and probably reflexes from the neck region. It apparently involves no decrease in medullary aeration. The fact that a patient with severe orthopnea who can not sleep in spite of sedatives or even morphine will often respond to mechanical treatment gives a practical finale to this rather academic discussion. Such a patient if fitted with blood pressure cuffs at the bases of his extremities will breathe easily and perhaps sleep in the recumbent posture as soon as these cuffs are blown up to diastolic pressure. The blood that has been congesting the lungs and over-stimulating respiration will be trapped in the extremities, and venous pressure will be reduced so that the change in the respiratory symptoms is very striking.

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CONCERNING COSTS OF MEDICAL CARE AND ATTEMPTS AT THE SOCIALIZATION OF MEDICINE*

One of the major trends of our times is in the direction of socialism. It has been insidious in its development, but progresses with an ever-increasing momentum. The matter under discussion is one of many outcroppings of this socialistic trend, and the individual's attitude toward it is determined largely by his socialistic or individualistic leaning.

I mention this fact, not for the purpose primarily of focusing discussion on these two conflicting philosophies, but for the purpose of giving the subject its proper setting. It is probably no more important, and its solution is no more pressing than many other more or less related socio-economic problems. I would suggest in passing that there may be no permanent satisfactory solution for these problems and that probably various groups an eon or two hence may be threshing over the same old straw that we are laboring over now. Theories nobly conceived, and which at the time seem thoroughly agreeable to reason, have a way of breaking down when put into practice. Swings from right to left and from left to right are probably inevitable and necessary for the correction of seemingly intolerable conditions that develop under either system.

Now, I do not propose to get excited over whether we have out-and-out socialism in this country or not, but for the benefit of those of you who may be inclined to scout the idea of such a possibility, I would like to state that we have a form of socialism now. Twenty per cent of all of the income of our population is absorbed by the Government in the form of taxes, and one worker out of ten has some sort of government job. I can not possibly conceive such a situation as representing anything but socialism by taxation. Let us not, therefore, deceive ourselves as to the plain significance of suggested reforms in the care of the sick. No matter how camouflaged they may be, each in varying degree marks a definite advance toward the socialization of medicine, and pari passu, of the country as a whole.

Those who clamor for some radical change from our present system of promoting health and caring for the sick base their appeal upon the assumption that large masses of our population are economically unable to share adequately in the benefits which modern preventive and curative medicine have to offer. Stated in another way, it may be said that medical progress and the means for an adequate distribution of its admitted benefits are out of step.

This question of production and distribution of medical care, therefore, begins to assume a strangely familiar aspect. Several proposals have been made with the view of synchronizing the two, but no one yet has advocated a moratorium on the progress of medical science or the uprooting of every third row of budding scientific promise. Some of us are fearful, and I think justly so, that this will automatically occur if some of the proposed reforms become effective.

No one yet has been able to state concretely what is meant by adequate medical care, no more than one is able to specify what constitutes adequate education. I think, therefore, that we may as well dismiss the term adequacy from our discussion and agree among ourselves that many people for various reasons do not fully participate in many of the supposedly good things of life, one of which is good medical care. One of the reasons, of course, is the individual's inability to pay the necessary price. It is the general opinion that under the present system the middle classes are the greatest sufferers, that the indigent are very well cared for medically and that the middle class, especially those of the lower income group, are the chief sufferers because they are neither poor enough to participate in the bounties of charity or rich enough to purchase good medical care at the prevailing market price. I do not believe that this view is entirely correct. Viewed in its larger aspect, the excellence of medical care is in proportion to the economic status of the individual who seeks it, and any scheme which contemplates the leveling of the one without also leveling the other is based on sophistical reasoning. It of course works out that way under the present system. Physicians generally render their personal service without regard to the economic status of the patient, and if we make certain allowances for wholly inevitable differences in the skill of physicians, which generally reacts in favor of the well-to-do, the difference in the medical care which rich and poor receive is found to be due almost entirely to subsidiary circumstances over which the medical profession has little or no control. To discuss these would take us far afield, but to indicate what I am driving at, I need only to remind you that the physician has no cure for ignorance, laziness, indifference, stupidity and a host of other conditions traceable thereto.

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* Read at the Stated Meeting of the Society, November 2, 1932.

The physician's attitude toward his job and the means used to secure his reward do not have their counterpart in any other field of human endeavor. His methods have been likened to those of Robin Hood's band who took from the rich to give to the poor. I would resent the comparison but for the fact that any other scheme that contemplates giving care to all the sick would, as I have previously intimated, do exactly the same thing. Nor am I convinced that any other scheme would do it any more equitably, as painlessly, or in the long run as well. I am certain that some of them, such as sickness insurance and state medicine, would greatly increase the total cost. The present system, operating as it does in a competitive market, and selling directly from producer to consumer, provides the essentials for cheap service. The very moment that a middle-man comes on the scene, whether it is the state, insurance, or any other intermediary, total costs will automatically and inevitably increase if quality of service is maintained. Who will pay the bill? It would seem that any school child must realize that the very same people will pay it that pay it now, the only difference being that they will have to pay more. Although so many of the well-to-do resent the sliding scale system of levying charges as practiced by physicians, let me point out that the law recognizes the essential justice of the underlying principle, and the Government applies it in the levying of taxes, as all who pay taxes must know.

Figures are uninteresting and I do not unreservedly subscribe to the axiom that they do not lie. Nevertheless, for the benefit of those who may not have paid much attention to this subject I will quote a few from the great mass that has been collected. The estimated annual medical bill of the United States for 1929 is said to have been $3,649,400,000. This is only slightly more than was spent for tobacco, toilet articles and moving pictures in that year, and only a little more than half as much as was spent for the purchase and upkeep of passenger automobiles. Of the total medical bill of the nation, individual patients or their families paid three-fourths, government one-sixth, philanthropic agencies one-twelfth, and industry one-fiftieth. Forty-two per cent was paid to physicians and dentists in private practice, which amount represented their gross incomes. About 12 per cent went to sectarian practitioners and for patent medicines. The remaining 46 per cent went for drugs, eye glasses, hospital service, and to various Government agencies supported, of course, by taxation. In considering these figures it should be remembered that 1929 was a boom year. Unfortunately, we have no comparative figures for other years. Certainly the 1932 figures would be a great deal less. Sickness, of course, does not diminish during hard times, but the incomes of physicians and dentists in private practice decrease probably as much as with any other class of citizens. Nevertheless, it may be fairly assumed that the medical bill of the nation has increased out of proportion to the increase in population, especially during the past two or three decades.

One of the reasons assigned for the alleged excessive costs of medical care is based on the assumption that physicians are poor business men. I believe this is another fallacy that needs to be "scotched" in order to clear the way for any constructive criticism or suggestions. Naturally, criticism of the physician's business ability comes mainly from the business man, especially the so-called big business man. It exemplifies the old, old story of the mote and the beam, of knowing exactly how the other fellow's business should be run even if his own is teetering on the rocks. Notwithstanding a seeming superfluity of clubs I think that there might be room for one more, the "Mind Your Own Business Club." Now, as a matter of fact, the medical profession as a class are no more stupid or deficient in business acumen than any other class. The rank and file of the profession does feel very strongly that so-called big business methods and mass production are not suited to the practice of medicine except in a very restricted way. They believe—and I think that their judgment in the matter is perfectly sound—that freedom of choice and the close personal relationship between the individual doctor and the individual patient should be preserved. This view is not based on mawkish sentimentality, as some might think, but on sound psychology and vast practical experience. Men are not machines, and I question whether the attempt of big business itself to deal with them in the mass has been attended by any real or permanent advantage to either.

I do not think that we need seek far for a perfectly simple and rational explanation for the increasing costs of medical care. The quality of medical care has increased enormously in the past two or three decades. I believe every one will accept that statement without argument. I believe also that all will accept the general proposition that increase in quality automatically increases costs. It doesn't matter whether we apply this principle to the making of shirts or caring for the sick, the result is the same. I can see no avenue of escape from the working of this basic law. Paths may entice, but all end in a blind alley. Quality must and will have its price. Expedients may be resorted to that will bring about a certain degree of uniformity, all red shirts or all black shirts, but it will be a uniformity of mediocrity, or something worse. I do not need to remind you that this is simply a restatement of the law of compensation. All of our arguments and discussions, therefore, center around the recognition and choice of alternatives.

The increase in the quality of medical care has, of course, brought with it problems requiring readjustments. Such problems are in no way peculiar to medicine. We lament the fact that in a land of plenty a few of our citizens go hungry; but suppose we were tilling the soil with a crooked stick, would not famine stalk through the land as it does still where overcrowding and such crude methods prevail? Our sympathies go out to those who do not receive the best of medical care; but suppose we were still treating disease by incantations and beating the tom tom, would not pestilence take its frightful toll as in days of yore? In comparison with some of the problems of the past I feel sure that we give some of our present-day problems an exaggerated importance and have a disposition to resort to reckless and wholly irrational experimentation, when, as we doctors would say in reference to many self-limited diseases, only mild measures and an expectant plan of treatment are indicated. As an example, let me cite the fact that specialization in the practice of medicine has been and still is going through a process of evolution. It has undoubtedly been a factor in increasing the costs of medical care, but it has also been an important factor in raising the standards of general practice. As the latter rises, the family doctor will be restored to public esteem, and the demand for service of specialists will proportionately decrease. Such a trend is already manifest, and any interference with the natural and orderly processes of readjustment is to be deprecated.

I think, too, that we are all too prone to belive that some sort of legislative or other fiat will solve our problems, and that by bringing together a group of people of wholly divergent trends of thought, such as the Wickersham Committee or the Committee on the Costs of Medical Care, some magic formula will be evolved that will cure our ills. All too often the result is an impractical monstrosity or the substitution of a greater evil for a lesser one.

Although I have no cure to propose this evening, there is one point on which I have strong convictions, namely, that in no field of human endeavor can there be continuing progress unless the liberties, opportunities, and responsibilities of the individual are zealously safeguarded and preserved. This has always been so; it always will be so. It is a policy exceedingly difficult to maintain. Encroachments on individual liberties and opportunities are so insidious and withal so plausible that we often find them gone before we realize that they are threatened. They reach major proportions in the extreme swings from right to left and from left to right, and the few suggestions I submit are made in the anticipation of a further swing to the left at this time, and with the realization that the recapture of liberties once lost is a slow and painful process. They are as follows:

1. That government competition in the practice of medicine be discontinued, and that its activities be restricted (a) to the care of the indigent, (b) to the promotion of public health, (c) to the Army and Navy, (d) to the care of veterans suffering from bona-fide service-connected disabilities and diseases.

2. That government care of the indigent be gradually expanded and extended with the ultimate objective of relieving the medical profession of the necessity of imposing and collecting a tax for their care.

3. That an abatement of duties and tariffs, preferably by reciprocal agreements with foreign governments, be effected on all materials used for medical research or for the diagnosis or cure of disease.

4. That the corporate practice of medicine, and all forms of general practice financed through intermediary agencies, be persistently and vigorously opposed as being economically wasteful or inimical to the continued and sustained quality of medical care, or both.

5. That better coördination of the health resources of communities be promoted by the establishment of commissions to act in an advisory capacity with respect to institutions for medical care with a view to securing maximum efficiency at minimum cost.

Thomas A. Groover, M.D., D.Sc.,
Washington, D. C.

PROGRAM, SOCIETY ACTIVITIES

The Program Committee announces the following program for January and February:

January 11: Conjoint meeting* of the Baltimore City Medical Society with the Medical Society of the District of Columbia in Washington, D. C. Buffet Supper.

January 18: Program under the auspices of the Section on Nervous and Mental Diseases.

January 25:

1. Dr. Walter R. Stokes: "Inadequate Sexual Function in the Male."
2. Dr. Carleton W. Bullard: "Factors in Diagnosis and Operative Technic which Influence the Convalescence after Simple Mastoidectomy."

February 8: Program under the auspices of the Osler Society.

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* Pursuant to a pleasing custom the Baltimore City Medical Society will furnish the program. Our Society was entertained in Baltimore in 1931.

February 15:

1. Dr. Prentiss Willson: "Indications and Technic for the Induction of Labor."
2. Dr. A. B. Bennett: "The Cure for Mastoid Fistula with Fat Graft: A Case Report."

ANNUAL MEETING

Scientific Sessions April 25th and 26th

The Annual Meeting of the Medical Society of the District of Columbia, for the election of officers and transaction of annual business, will be held on the evening of Wednesday, May 3, 1933. In view of the triennial appearance in Washington of many national medical organizations, including the Association for Thoracic Surgery, Association of Pathology and Bacteriology, Climatological and Clinical Association, Gastroenterological Association, Gynecological Society, Laryngological Association, Ophthalmological Society, Orthopedic Association, Otological Society, Surgical Association, Association of American Physicians, Congress of Physicians and Surgeons of North America and Pediatric Society, in the early days of May, 1933, it was deemed advisable by the Committee on Arrangements, of which Dr. H. N. Dorman is chairman, to hold the scientific sessions during the last week of April. It is proposed to have meetings on two days, *Tuesday and Wednesday, April 25 and 26.* Although the preparation of the program is still in an early formative stage, the prospects at this time are bright for excellent presentations in the form of papers, clinical demonstrations and pathological exhibits. Dr. Eugene R. Whitmore is again in charge of exhibits. The technical exhibit this year, to be held in the Library, is expected to exceed both in interest and in the number of participants, the pace that has been set in previous years. The constant return of exhibitors of commercial products means that they are obtaining satisfactory results such as can only be obtained through the holding of all meetings as well as exhibits in a single building. The program is in general charge of the Program Committee. Members are especially urged to present to Dr. Wallace M. Yater, Chairman, at an early date any contemplated papers or other clinical presentations. More time will be devoted to entertainment of wives and families of visiting physicians through an active participation by the Woman's Auxiliary. Dr. Dorman, the general chairman, wishes especially to emphasize preparations that are being made for social events. The complimentary Mayflower luncheon for guests and members will again be held. Members are requested to bear these dates in mind and make preparation for participation. The personnel of the Committee on Arrangements:

H. N. Dorman, *Chairman*
Grafton Tyler Brown, *Attendance*
F. A. Hornaday, *Luncheon*
A. B. Bennett, *Halls*
Eugene R. Whitmore, *Exhibits*
Edith SeVille Coale, *Women Physicians*
Wallace M. Yater, *Program and Medical Clinics*
John Hugh Lyons, *Surgical Clinics*
Daniel L. Borden, *Moving Pictures*
Thomas A. Groover, *Public Meeting*
James A. Cahill, Jr., *Hospitals*
Herbert P. Ramsey, *Publicity*
Fred A. J. Geier, *Entertainment*
Coursen B. Conklin, *Registration*

COUNTY SOCIETY MEETS

The Fauquier County Medical Society was entertained the evening of December 1, by Dr. Stewart McBryde of Manassas, Virginia. Major General Robert U. Patterson, Surgeon General of the United States Army, was the guest of honor and delivered an impromptu address on "The Contributions of the Army Surgeon to the Art and Science of Medicine." The meeting was held at an old homestead about five miles from Manassas, where Virginia hospitality was much in evidence. The officers of the Fauquier County Medical Society are: John T. Sprague, of Warrenton, President; Stewart McBryde, of Manassas, Vice President; M. B. Hiden, of Warrenton, Secretary-Treasurer. A number of Washington physicians attended, including, Oscar B. Hunter, John R. Lloyd, Wm. Arthur Morgan, and Charles S. White.

REPRINTS

- "Neoplasms Primary in Bladder Diverticula," Journal of Urology, June, 1932, by R. M. LeComte, M.D.
- "Treatment of Prostatism by Endoscopic Revision," Medical Annals of the District of Columbia, May, 1932, by R. M. LeComte, M.D.
- "Nerve Suture and Muscle Repair," Annals of Surgery, January, 1932, by Edmund Horgan, M.D.
- "Preventive Medicine Founded on Specialism," Indian Medical Record, December, 1931, by Dr. Aurthur Macdonald.
- "A Clinical Evaluation of Transurethral Resection of the Prostate," Medical Annals of the District of Columbia, October, 1932, by W. Calhoun Stirling, M. D.

IN MEMORIAM—WILLIAM WILLIAMS KEEN, M.D.*

The Medical Society of the District of Columbia notes with deep regret the passing of their oldest Honorary Member, Dr. William Williams Keen of Philadelphia. Dr. Keen died on June 7, 1932, at the ripe old age of 95. Of all the illustrious names that have graced our membership roll, few have attained the recognition that came to Dr. Keen. He held honorary degrees from four foreign universities and from eight universities in his own country. He was some time president of the leading medical and surgical societies of America—The American Medical Association, the American Surgical Association, the International Congress of Surgeons, and the Congress of American Physicians and Surgeons, etc. He was an Honorary Member of the Royal College of Surgeons of England, the Royal College of Surgeons of Edinburgh, the Royal College of Surgeons of Ireland; a member of the French, Belgian and Italian Surgical Societies, and numerous medical and scientific societies of this country.

He was graduated from Jefferson Medical College during the Civil War, and immediately joined the Union Forces as assistant surgeon to the 5th Massachusetts Regiment. It was his experience at that time that led to his important contributions on the anatomy and surgery of the peripheral nerves. After the Civil War, Dr. Keen studied abroad at various medical centers. In 1867, he married Emma Corinna Borden of Fall River, Massachusetts. Four daughters blessed this union. Dr. Walter Freeman, a member of this Society is a grandson of Dr. Keen. Dr. Keen was an active practitioner of surgery in Philadelphia from 1866 until his retirement in 1907 at the age of 70 years. During this long and useful professional life he contributed abundantly to the medical and scientific literature. His "Keen's System of Surgery" will be a monument to his pre-eminence in the surgical world.

A long life of great service, not only to the thousands of individuals who came under his professional care, but to his colleagues at home and abroad through his teachings and writings is, after all, the finest memorial to one of America's greatest surgeons.

James F. Mitchell,
Thomas E. Neill,
H. H. Kerr, *Chairman*,
Committee.

JOHN LLEWELLIN ELIOT, M.D.

On November 14, 1932, John Llewellin Eliot, an honored member of the Medical Society of the District of Columbia since 1883, died in Minneapolis. Dr. Eliot was a native of Washington, born August 2, 1853, the son of Johnson Eliot, M.D., a noted anatomist. He served as President of the Medical Association of the District of Columbia, 1893–4. The medical profession profited by his devotion to the Society's interests throughout his long career by his serving on important committees such as Public Health, Legislative and Publication. During his later years he was a resident of Minneapolis at the home of his son-in-law F. E. Harrington, M.D., Commissioner of Health, City of Minneapolis. A special committee consisting of Drs. John B. Nichols, Edward Y. Davidson and D. Percy Hickling has been appointed to draw up suitable resolutions.

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* Presented before the Society, November 9, 1932.

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